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Editorial Notes

Gas for Motor Transport

WE have continuously emphasized how the flexibility of the Gas Industry's process renders the Industry of enormous potential help to the nation, and we referred in last week's "JOURNAL" to some of the directions in which it could be of assistance in wartime. One of these was the production of gas and benzole for motor transport and the production of reactive coke for use in gas producers for road vehicles. Let us for a moment consider the use of gas for transport. The use of compressed gas for the propulsion of motor vehicles has been shown to be a thoroughly practical and highly satisfactory proposition, and its use should now be encouraged. A great deal of practical experimental work has been undertaken in this country, particularly during the past ten years or so, to demonstrate the technical soundness of the principle, and recently great strides have been made in the design of new types of engine. A high-compression engine has been evolved which is identical in operation, except for a new type of carburetter, with the ordinary diesel engine. Existing types of petrol and diesel engines can be readily and cheaply converted to gas fuelling.

On this matter of gas for motor transport, at once spring to the mind the investigations, among others, carried out at Birmingham, Newcastle, Chesterfield, Wallasey, Rotherham, and in the London area by the Gas Light and Coke Company and the Tottenham Gas Company. In certain circumstances the substitution of town gas for petrol has been worked out as a favourable economic proposition in peace-time. War-time conditions put an entirely different aspect on the whole problem. As long ago as 1934 the National Gas Council issued a report on the use of compressed gas for the purpose. In it was the following statement: "The technical problems involved in the substitution of gas for the propulsion of motor vehicles as at present designed for the use of liquid fuel have been solved. During the past year motor vehicles have been running continuously and successfully upon compressed gas. No alteration to the engine has been necessary beyond the substitution of a gas and air mixing valve for the usual carburetter, and no alteration to the chassis beyond the substitution of alloy steel cylinders for the usual petrol tank." It was found at that time that 250 cu.ft. of gas of a calorific value of 500 B.Th.U. (*i.e.*, 1¼ therms) was equivalent to a gallon of motor spirit. The modern developments of which we have spoken will, of course, result in a modification of this figure.

The fact remains, however, that an engine of the ordinary type, without modification to the latest principle, can be converted without any difficulty to town gas running, and that 1¼ therms can under these conditions be regarded as the equivalent of a gallon of petrol. We have followed the work done on the development of gas for transport fully in the "JOURNAL," and our pages testify that technically gas is "all there on the game." To-day its widespread use now merely needs encouragement, and it is to be hoped that the efforts of the National Gas Council in respect of the weight of vehicle cylinders will at long last prove availing, and that the stringent regulations imposed by the Home Office on the cylinders themselves will be modified in view of the present emergency conditions. There is, of course, the question of the availability of cylinders. At present these are not available to the Gas Industry. Obviously it is a matter of priorities, but the situation undoubtedly calls for review, and we know that, as far as the Gas Industry is concerned, it is receiving close attention in the right quarters and that individual undertakings are going ahead hopefully with development work.

While decisions as to the availability of cylinders are being made, it would be well for gas undertakings to acquaint themselves anew with the economics of gas propulsion and be fully *au fait* with the newer technique. Gas compares favourably with petrol in giving a higher efficiency, more flexibility, and better acceleration, and crank case dilution is avoided. Lorries or 'buses could carry enough town gas for a 60-75 mile journey as compared with 100 miles for petrol. There are already several filling stations, and these could cope to some extent with local needs. Many more would be needed for large-scale development of gas transport over long distances, and admittedly such stations would require fairly expensive equipment such as high-capacity pumps and high-pressure storage vessels. The filling from the tanks of cylinders carried by vehicles is, however, quite a simple matter. Altogether the arrangements and apparatus for using gas have been the subject of extensive trial and are satisfactory. The range of the vehicle depends, of course, on the calorific value of the gas. The cost of compression would be reduced and the operating radius increased in proportion to calorific value.

Then, of course, as we also mentioned last week, whatever difficulties there may be in the provision of equipment for the use of compressed gas, there can always be resort to the expedient used during the last war—the "gas bag." In 1918 the Inter-Departmental Committee on Gas Traction reported that: "It is desirable that owners of gas undertakings should themselves be suppliers of gas for traction purposes and that they should also allow re-sale through the intermediary of motor depots and like establishments. There should be no restrictions, except in so far as shortage of coal or other war conditions may render the imposition of control or priority

necessary upon the drawing of supplies of gas for traction purposes through suitable meters at consumers' premises or private filling stations." Already several gas undertakings have announced the steps they are taking in preparation for the supply of gas in bags for commercial vehicles and private cars ; and it is hoped that arrangements will be made for filling the bags with gas not only at the works and depots of the undertakings but also at garages and service stations. On a later page we review the situation from the two angles of compressed gas and gas at ordinary mains pressure. It will be seen that within a few days one London firm will be able to equip up to 300 vehicles per day with gas bags and carry out the necessary carburetter adjustments for gas propulsion. It will be seen, too, that supplies can be arranged so that gas can be turned off and petrol turned on simply by closing one tap and opening another. Granted encouragement, the possibilities of gas for motor transport in wartime are very great indeed.

Gas Supply in Wartime

EVACUATION from the vulnerable areas to zones of safety means loss of load to the gas undertakings in the vulnerable areas and unprecedented demands on those undertakings in the safety zones ; and, as we have already emphasized, more than ever now do we need co-operation among gas undertakings, among all concerned with gas manufacture and supply. We have also suggested the possibilities of interconnexion of supply, so that undertakings with plant surplus to their demands can assist those in rural districts called upon to cope with heavy loads and which must obtain somehow a further supply of gas. Under normal conditions increases would be covered by erecting additional carbonizing or water gas plant. If, however, we assume that the heavy demands in the safety zones will cease at the end of the war, then one is forced to consider the alternative of long distance supply from the evacuated areas to the areas receiving evacuees.

Let us look at the problem broadly and consider it on the following general lines. Take an undertaking faced with capital expenditure for new gasmaking plant which has to be paid off rapidly. We may then ask what length of main could be laid from another undertaking so that the capital charges on the main and compressing plant over the same period, plus the cost of compression, would equal the capital charges on new gasmaking plants for the undertaking in the reception area. We think we are at any rate near the mark in assuming that, for comparative purposes, coal gas plant, including purifiers, would for an output of one million cu.ft. per day cost £40,000 and for three million cu.ft. per day cost £105,000. For similar capacities, and again including purifiers, carburetted water gas plant would cost round about £23,000 and £60,000.

Let us make the further assumptions that the capital charges are amortized in three years and that the connecting main passes a constant quantity of gas per day throughout the year. Now a one million cu.ft. coal gas extension costing £40,000 and amortized in three years gives capital charges equivalent to 8.8d. per 1,000 cu.ft. On the other hand, a 4 in. diameter main 21 miles long, costing with compressing plant around £29,000 and transmitting one million cu.ft. per day would entail, in capital charges over three years, plus compression costs, 8.3d. per 1,000 cu.ft. Taking carburetted water gas plant of like capacity, we draw the conclusion that capital charges would amount to 5d. per 1,000 cu.ft. A 4 in. diameter main 11 miles long, costing with compressing plant about £15,000 and transmitting the same amount of gas, would entail capital and compression charges of about 5d. per 1,000 cu.ft.

Let us take the comparison further to the three million cu.ft. per day output. With coal gas plant charges would amount to 7.7d. An 8 in. main 35 miles long with the necessary compressing plant and compression charges would entail a cost of 7.6d. per 1,000 cu.ft. A three million cu.ft. per day carburetted water gas plant would entail a cost of 4.4d. per 1,000 cu.ft. For the same cost it would be possible to have an 8 in. main about 17 miles long.

There are other points to consider. The actual capital sunk in the main and compressors would be about 70% of that required for new carbonizing plant, and it may also be taken that the time required for laying a main and installing compressors would be substantially less than that needed for new carbonizing plant. Then, of course, the possible length of main would be modified if gas could be produced more cheaply at the works of an undertaking in an evacuated area than at the works of an undertaking in a reception area. The foregoing comparisons, it should be noted, refer only to conditions where the capital sums involved are amortized in three years. If this period is lengthened, the lengths of main will be correspondingly reduced. As we have said, we have looked at the matter very broadly, and naturally each case must be examined on its individual merits. The question is, however, obviously of the utmost importance. Not the least important aspect is that interlinking of supply would enable the mains to be tapped en route and would greatly extend the scope of rural gas service, to the possible lasting benefit of the Gas Industry after the conclusion of war.

Fuel Rationing

IN last week's "JOURNAL" we published the full text of the Fuel and Lighting Order made by the Board of Trade, comment on the rationing provisions of which in relation to gas and coke was made in our columns on Sept. 13. The Mines Department has now announced that the rationing restrictions will not apply to prepayment consumers—and this affects more than 7,300,000 consumers of gas in Great Britain. Ordinary consumers number a little over 4,000,000, and they will not be rationed below 100 therms of gas and 2 tons of coke per annum. Above this the limit is fixed at 75% of the quantity consumed in the corresponding quarter of the year ended June 30, 1939. Obviously, the announcement regarding non-rationing of prepayment consumers will be welcomed by the consumers themselves and by the Gas Industry, which realizes well enough that there is now particular need for a labour saving fuel on tap. Naturally, prepayment consumers, as other consumers, will be expected to use their gas supply in the most economical manner. The need for economy in general, however, will ensure this. From now on ordinary consumers will not, except in special cases approved by the local fuel overseers, be allowed to change to prepayment meters.

The British Commercial Gas Association has already taken steps to advise housewives how they can face the twin problems of reducing gas consumption and getting greater service from their gas supply, and in this regard their close contact and co-operation with the Press has proved of very great value. For the time being the Association cannot, of course, push the sales of gas, but much useful work of an advisory and exploratory nature remains for it to do. Wartime conditions will bring many enquiries, and the B.C.G.A. is there to answer them and to help individual undertakings to carry on, as far as possible, "business as usual," and to ensure continuity of gas service in its many aspects. It can help the housewife to avoid wasted food—to obtain better meals for less money. For the past two years much investigation has been made on the question of dietetics by the Gas Industry, and the results of this work are available to the gas consumer through the B.C.G.A. This should prove of immediate and very real help to all gas consumers, and particularly to those responsible for catering in the reception areas, who will be led to look to their local gas undertakings for guidance. Schoolteachers, for example, will find of great assistance the information on the subject of wise and economical dieting and preparation of meals by gas which is contained in booklets which the Association is making available without delay.

A Welcome Step

All sections of the community, and especially those concerned with that "thing of the past"—public lighting—will learn with considerable interest of Bolton's decision to bring into use again two hundred gas street lamps. Not, of course, to relieve the stygian gloom of the streets, but as direction indicators to air raid shelters, first-aid posts, &c. The Lighting Superintendent is having the glass sides of the lanterns blackened save for the appropriate words and an arrow. No dangerous light is emitted; yet the indication is clearly discernible in the darkened streets. Such a step is to be welcomed from every point of view. Primarily from considerations of public safety, but also as affording some measure of relief to utility undertakings whose plant for the maintenance of public lighting—at both the production end and the point of supply—represents valuable capital lying idle. Street lamps utilized in this manner at strategic positions would be of inestimable help in guiding those on the roads, and some extension of the idea to embrace indications of dangerous road intersections and even the names of thoroughfares might well be considered. Obviously no more light would be emitted than that from the street refuge signs which are already in operation. It would be of value to have an official pronouncement on this important matter.

Personal

The resignation of Mr. JOHN DUNCAN, Gas Manager at Kirriemuir, was received at a meeting of the Directors of Kirriemuir Gas Company, on Sept. 20. It was decided to record an expression of appreciation of his services. Mr. Duncan was appointed Gas Manager at Kirriemuir in 1899. A native of Springfield, Fife, Mr. Duncan has been for 25 years an elder of Kirriemuir Barony Church. He is one of the founders of Kirriemuir Burns Club.

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The wedding took place at Banstead (Surrey) on Sunday, Sept. 10, of Mr. J. H. Canning (Engineer and Manager of the Melton Mowbray Gas Light & Coke Company) and Miss M. Marshall, only daughter of Mrs. Marshall, formerly of Newport and now of Brighton, and the late Mr. C. H. Marshall. Mr. Canning is the second son of Mr. J. H. Canning, O.B.E., J.P., and Mrs. Canning, of Newport (Mon). Owing to the outbreak of war most of the original arrangements were cancelled, and after the ceremony Mr. and Mrs. Canning proceeded straight to Melton Mowbray.

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Mr. W. A. HOWIE (Engineer and Manager of the Gravesend and Milton Gas Light Company) has been appointed Chairman of the Fuel and Lighting Committee of the Borough of Gravesend. He has also accepted nomination by the Gas Engineering Sub-Committee of the Advisory Council of the Ministry of Labour to serve as a member of its Regional Panel in the No. XII Region in regard to the Central Register of persons with scientific, technical, and professional qualifications for use during the war.

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The members of the local Fuel Advisory Committee have elected Mr. GEO. WRIGHT (Engineer and Manager of the Lincoln Gas Department) to act as their Chairman.

Obituary

Mr. J. ROBERTSON DUFF, aged 64, formerly Gas Manager at Morecambe, has died. In 1907 Mr. Duff left Morecambe to take up the position of Manager and Secretary of the Banbury Gaslight and Coke Company. In 1922 he joined the Board as Managing Director, which position he resigned in 1931 after 25 years' service with the Company, though continuing to be a Director. He leaves a widow and grown-up family.

Forthcoming Engagements

Sept.
29.—**I.G.E.**—Joint Research Committee, 2.30 p.m.

Oct.
3.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
6.—**I.G.E.**—Joint Committee on Complete Gasification under Pressure, 14, Old Queen Street, S.W. 1, 3 p.m.
9.—**I.G.E.**—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.
10.—**I.G.E.**—Council, 10 a.m.
11.—**I.G.E.**—Board of Examiners, 2.30 p.m.
17.—**I.G.E.**—Gas Education Executive Committee, 2.30 p.m.
26.—**Coke Oven Managers' Association.**—Annual Dinner, Hotel Victoria, W.C.2.
27.—**Coke Oven Managers' Association.**—Annual Meeting, Royal Station Hotel, York, 11.45 a.m.
30.—**L.C.C.A.**—Annual General Meeting, May Fair Hotel, W.

Nov.
8.—**Southern Association.**—General Meeting, Hotel Victoria, W.C. 2.

Institution of Civil Engineers

It is announced that the Council of The Institution of Civil Engineers have decided to continue, as far as may be practicable, the work of the Institution from the headquarters building in Great George Street, Westminster, S.W. 1.

The Meetings of the Institution in London will be suspended until further notice, and the Conference on Engineering Education and Training and the Road Engineering Exhibition are postponed indefinitely. The Reading Rooms and Library will be open, and the normal loan service of books available for the use of members. It is proposed to continue publication of the *Journal*, although it may be necessary for it to appear in a different form. The October examinations of the Institution will be held in London but not in the Provinces. The Council will continue to co-operate in the work of the Central Register of the Ministry of Labour and to assist the War Office and other Service Departments in the recruitment of qualified Civil Engineers for posts in which their professional experience is of value.

Institute of Fuel

Melchett Lecture and Presentation of Medal

At a Meeting of the Council held last week it was decided to cancel the Annual Dinner and Dance arranged for Thursday, Oct. 19 next. All monies already received for tickets will be returned in a few days' time.

As a partial substitute for the Annual Dinner, and in honour of Mr. H. A. Humphrey, the Melchett Medallist, the Council decided to arrange a Luncheon to be held at the Connaught Rooms at 12.45 for 1.15 p.m. on Thursday, Oct. 19, when copies of the Melchett Lecture will be given to all present and Mr. Humphrey will give a summary of his Address, together with some additional information, and the Melchett Medal will be presented to him. The Melchett Lecture will be available for publication.

Tickets for Members and their Guests will be 7s. 6d. each, exclusive of wines. In order to ease the work of the Institute Staff in organizing this Luncheon, Members are asked to apply for tickets as early as possible, accompanied by a remittance (and if possible the names of their guests) to the Secretary, 30, Bramham Gardens, S.W.5. Should it be found later that the luncheon cannot be allowed due to war or other restrictions, all money received for tickets will be returned in full.

The title of Mr. Humphrey's Melchett Lecture is: "The Supply of Explosives During the Last War and the Early History of Billingham."

Publication of Journal

The ordinary meetings for the presentation and discussion of papers are to be suspended for the time being, as such meetings could only be held during daylight hours when members are occupied with more important duties and could not attend. Should it be possible later to hold evening meetings, they will be resumed.

Meantime, the Council have decided to continue publication of the *Journal* and publish in it papers which would have been presented at the ordinary meetings, and invite discussion on them by correspondence. Technical information from other sources likely to be of interest and assistance to members will also be included.

In order to enable members to keep in touch with one another, a section of the *Journal* will be set aside for publication of changes of address and such information as is permitted of their movements and activities. Members are therefore invited to send such information to the Secretary for incorporation in this section.

It is also intended to arrange luncheons in London periodically so that members can keep in touch with one another. Whenever possible, a speaker will give a short address following the lunch.

News of the Week

The Annual Dinner of the Association of British Chemical Manufacturers, which was to have been held on Oct. 12, has been cancelled.

The Erection of New Showrooms by the Dundee Corporation Gas Department at Broughty Ferry is not to be proceeded with for the time being.

The Gas Showrooms of the Swadlincote Urban District Council have been given up and will for the time being be utilized as a National Registration Office.

It is Announced that the Annual Meeting and Luncheon of the London and Counties Coke Association, provisionally arranged for Oct. 31 at the Mayfair Hotel, has had to be cancelled.

The Price of Gas to ordinary consumers is to be increased by the Liverpool Gas Company to 9d. per therm—the increase to become effective on meter readings taken subsequent to Dec. 31 next.

Approximately £20,000 has been spent by the Leicester Corporation Gas Department on their A.R.P. schemes, which include protecting important buildings and providing shelters for their staff.

All Hire-Purchase Facilities in connexion with the gas undertaking have been suspended until further notice by an emergency committee appointed by the Colne Town Council. Agreements already in existence will be continued.

Experiments are Being Made by the Engineering Department of the Manchester Corporation Transport Department as to the expediency of utilizing coal gas, compressed in cylinders, for the propulsion of motor buses during the war period.

The Calling Up of Collectors for Military Service is creating a problem in connexion with the emptying of prepayment meters. It is reported that already gas undertakings in Scotland are conferring as to ways and means of reducing the number of collections.

At a Meeting of the Council of the Coke Oven Managers' Association, held at York on Sept. 15, it was decided to cancel all arrangements in connexion with the Annual Dinner which was to have been held in London on Oct. 26. The Annual Meeting of the Association will, however, take place—at the Royal Station Hotel, York, on Friday, Oct. 27, at 11.45 a.m.

The Following Officials of the Sheffield and District Gas Company have been appointed to the respective Local Authority Fuel Advisory Committees: Mr. S. T. S. Musgrove, to the City of Sheffield and the Chesterfield Rural District Council Advisory Committees; Mr. A. Wylie to the Rotherham R.D.C., the Wortley R.D.C., and the Dronfield R.D.C. Fuel Advisory Committees. In addition, Mr. H. H. Collett has been appointed Group Organizer for the Company's transport in connexion with the petrol rationing scheme.

The Fire Fighting Scheme recently formulated at the Falmouth Gas-Works as part of their A.R.P. organization was provided with a practical test of its efficiency when a fire broke out at the works on Sept. 13. A small motor van owned by the Company caught fire, and the flames spread to an adjacent shed and assumed proportions which for a time looked very serious. The fire-fighting squad, however, with the assistance of the local fire brigade, soon had the outbreak under control—thus ably demonstrating the value of the works A.R.P. organization.

Llandudno's Three Lamp Lighters, whose duties have been curtailed by lighting restrictions, are now maintaining a day and night service at the gas-works telephone, ready for any air raid warning which may come through.

An Invitation is Extended by the Committee of the International Building Club to everybody associated with any branch of the building industry to make full use of the Club premises at 141, Park Lane, London, W. 1, for the duration of the war.

The Statutory Autumn Meeting of the Iron and Steel Institute will be held on Thursday, Nov. 23, at 3.30 p.m., at the offices of the Institute, 4, Grosvenor Gardens, S.W.1. No papers will be read or discussed; only formal business will be transacted.

No Meetings of the London & Counties Coke Salesmen's Circle or the London & Counties Coke Distributors' Salesmen's Circle will be held until further notice. Any enquiries should be addressed to the Hon. Secretary, 1, Grosvenor Place, S.W. 1.

So That Closer Contact can be Maintained with Members and any Government Department to which the Institute of Fuel may be of service, it has been decided to remove the head office to: 30, Bramham Gardens, London, S.W.5. Telephone No. Frobisher 3649, to which address all communications should be sent until further notice.

Members of the Institute of Fuel will be interested to know that, in accordance with the Resolution passed at the Extraordinary General Meeting on July 19 last, a Petition was presented to His Majesty's Privy Council on August 24, praying for the grant of a Royal Charter to the Institute. The Petition was signed by the President, Past-Presidents, Vice-Presidents, Hon. Officers, and Elected Members of Council.

The Gas Fire Scheme at Rhyl is to be discontinued, and in its place the Rhyl U.D.C. has approved a recommendation to offer existing consumers under the scheme the option of transferring to a metered supply at a rate of 2s. per 1,000 cu.ft. At the Council meeting, Mr. O. P. Cronshaw (Gas Engineer and Manager) said gas for fires would still be supplied at practically half the ordinary rate of 3s. 11d. per 1,000 cu.ft. He did not think there was any other place in North Wales where gas was supplied for fires at only 2s. per 1,000 cu.ft.

By the Chairman's Casting Vote, the Oswaldtwistle Urban District Council on Sept. 21 confirmed an increase in gas charges to take effect from Oct. 1. The charge for prepayment meters has been increased from 9.75d. per therm to 11.75d. and for domestic consumption from 9.25d. per therm to 10.75d. for the first 24 therms per quarter, 8d. for the next 48 therms, and all above 72 therms 6d. There is 2½% discount against ½d. per therm discount previously. Charges are also revised for industrial, industrial lighting, and central heating purposes, as well as for public lighting.

Although the Price of Gas depends, of course, on the cost of coal, and if the latter becomes dearer the position will naturally alter, it is stated that so far there is no indication of any necessity to increase the price at Plymouth in the near future. The Plymouth and Stonehouse Gas Light and Coke Company consumed 82,000 tons of coal last year, stated an official on Friday, Sept. 22, the transport of that quantity to Plymouth involving 36 voyages. With gas consumption rationed the quantity of coal required by the company would be reduced by 25%. In the area served by the company there are nearly 30,000 slot meters, the users of which will not be rationed.

Falkirk's New Showrooms Opened

Ex-Provost Muirhead, Convener of the Falkirk Gas Committee, last week performed the opening ceremony of the new gas showrooms. The chair was occupied by Provost Begg, and members of the Town Council attended.

The building is substantially constructed of reinforced concrete and has a handsome, utilitarian appearance. The spacious showroom windows provide a maximum frontage. These windows are bordered by bronze, and above them and running almost the full length of the building is bronze lettering on a black marble background. Above the frontage and set back a little to provide a balcony, is the upper storey structure, which houses a showroom devoted to gas illumination and a lecture hall. On the balcony are powerful floodlights.

The main entrance gives directly into the main showroom. This saloon, panelled for most of its height in Australian walnut, is divided into bays. In each bay is exemplified some applications of gas to modern life. There are gas fires of new design, reading lamps, water-heating systems, &c. In another showroom on the same floor are demonstrated various water-heating appliances. Beyond this showroom is a workshop for small repairs.

The upper floor is mainly occupied by the lecture hall. Designed to hold 150 persons it is attractively appointed with tubular plush-covered chairs. At the far end is a wide stage. On the left of the stage is the kitchen. Projecting into the lecture hall from the above is a camera chamber so that film demonstrations may be given. The other showroom on the upper floor will be used to demonstrate the utility of gas as a lighting medium.

The architects of the new premises were Messrs. Copland and Blakey, High Street, Falkirk. As previously announced in the "JOURNAL," the showrooms were open to the public as from Sept. 19.

War Time Changes of Address

In addition to the lists published in previous issues we have been notified of the following changes of address:

Armco, Ltd., c/o Engineering and Metals Co., Ltd., Icknield Way, Letchworth, Herts.

Ascot Gas Water Heaters, Ltd.—Entire Head Office staff and organization transferred to Ascot Works, Neasden, N.W.10. Phone: Willesden 5121.

British Aluminium Co., Ltd., Raven Hotel, Castle Street, Shrewsbury, Salop. Phone: Shrewsbury 4451. Telegrams: "Cryolite, Shrewsbury." All branch office addresses remain unchanged.

British Timken, Ltd. London office closed. All communications to Works, Cherton Road, Aston, Birmingham, 7.

Concrete Proofing Co., Ltd., 10, The Headway, Ewell, Surrey.

Danish Gas Company, 22, Leigham Drive, Isleworth, Middlesex. Phone: Hounslow 0283.

Electric Construction Co., Ltd., Lamport Hall, Northampton. Phone: Maidwell 221.

Expanded Metal Co., Ltd., "Dunedin," Underwood Road, Caterham, Surrey. Phone: Caterham 76.

E. Foster & Co, 9, Eagle Brow, Lymm, Cheshire. Phone: Lymm 361.

Foamite, Ltd., Station Road, Langley, Slough, Bucks. 'Phone: Langley 194.

Institute of Fuel, 30, Bramham Gardens, S.W.5. 'Phone: Frobisher 3649.

Lancashire Tar Distillers, Ltd., Chronicle Buildings, 74, Corporation Street, Manchester, 4.

Liptak Furnace Arches, Ltd., Maxwelton, Bolton Road, Haywards Heath.

Malta & Mediterranean Gas Company, c/o Brighton, Hove & Worthing Gas Company, Gloucester Road, Littlehampton, Sussex. 'Phone: Littlehampton 585.

Metters, Ltd., Bank House, High Street, Rickmansworth, Herts.

Oriental Gas Company, Winter Hill House, Cookham Dean, Berks. Phone: Marlow, Bucks, 79.

W. A. Scott & Co., 42, Foxgrove Road, Beckenham, Kent.

South Metropolitan Gas Company, 12, Vanbrugh Park Road West, Blackheath, S.E.3.

The Super Heater Co., Ltd., St. Margarets Road, Bowdon, Altrincham, Cheshire. 'Phone: Altrincham 3381

Underpressure Engineering Co., Ltd., 14, Mill Road, Burgess Hill, Sussex.

C. & W. Walker, Ltd.—London Office transferred to Midland Iron Works, Donnington, near Wellington, Salop. 'Phone: Lilleshall 34.

West's Gas Improvement Co., Ltd.—It should be made clear that the London Office *only* has transferred to Harmondsworth (see last week's "JOURNAL," p. 602). The Head Office will continue to operate from Miles Platting as usual.

British Industries Fair

The Department of Overseas Trade announces that the British Industries Fair, which was to have been held in London and Birmingham in February, 1940, is cancelled.

The Department of Overseas Trade will communicate with individual exhibitors in the London Section, and the Birmingham Chamber of Commerce with individual exhibitors in the Birmingham Section.

The large-scale catering equipment section of Radiation, Ltd., have now centralized their London showrooms at 4, Berners Street, W.1. Our photograph shows some of the apparatus displayed

Burton-on-Trent to Have New Carbonizing Plant

The Burton-on-Trent Town Council have authorized the Gas Committee to accept a tender not exceeding £65,000 for the provision of a new carbonizing plant at the gas-works.

When the recommendation was before the Council, Alderman Giles called attention to the fact that last year there was a deficit on the Gas Undertaking of £5,400, and said he did not think the Council had had enough time to decide on such a big issue.

In reply, the Mayor said it did look as if it was a large expenditure. The primary cause of the £5,400 deficit was the obsolescence of the plant, which was very old. The Gas Engineer had stated that he could not guarantee to continue production of gas more than two years ahead with the present plant. To put the existing plant into a proper state of repair would cost in the region of £23,000, and such expenditure would not provide the most economical form of production. With the new plant there would be a considerable saving in the method of production. He pressed for the matter to be done at once because he considered it a vital necessity in war time that plant should be right up to date from the point of view of a national emergency.

Gasholder Repairs

Gas engineers have naturally in mind possible damage to gasholders in the event of air-raids. Mr. Leonard Bott, the Independent Gasholder Inspector, has sent us a booklet entitled "Always Ready Patches," which he is forwarding to engineers and managers of gas-works throughout Great Britain.

The booklet is specially prepared to show how best to patch a gasholder so that the patch becomes a reinforcement of the weakened or damaged part. Further, Mr. Bott has designed special patches in three sizes, which are ready drilled, flattened, and painted, so that they can be immediately applied to almost any part of a gasholder. The method of fixing these by the patented "Bott" double bolt is shown in four stages. The booklet should prove of help to the gas engineer.

In a letter accompanying the booklet, Mr. Bott gives the following suggestions for action in case of a puncture of a gasholder from any cause—a method he has used on several occasions.

First locate the leakage, then push into the hole some rag or cotton waste. If the puncture is on the crown, put a weight on the material pushed into the hole, to keep it in. Alternatively it may be secured by strips of "Denso" and this may be left in position permanently.

If the puncture is on the side sheeting, the waste or rag must be pressed in the hole tightly and then "Denso" will complete the security. Place the "Always Ready Patch" centrally over the damage and mark off two adjacent bolt holes, remove the patch, and mark off two other holes outside the patch, the distance apart to correspond with the legs of the double bolt. When these four holes are drilled, two bolts can be put into position with the felt and steel washers and one nut on each on the outside ends of the bolts.

There are then two bolts in position on which the appropriate holes of the patch may be carefully placed. When this is done put the felt and steel washers on the other ends of the bolts, screw up moderately tight, and, after this, all other holes in the gasholder will be drilled through the holes existing in the patch.

If this is studied with the handbook illustrating the process, it will be seen how simple the method is. The "Bott" bolts can be screwed up tightly, without possibility of their turning, after all are in position.

Red lead should be laid on the gasholder side of the patch and the waste or rag left in the hole to prevent escape of gas during the operation.

Key to Emergency Legislation

There can hardly have been such a mass of legislation passed in so short a time as during the first fortnight of September, 1939. Many of the provisions affect every citizen, and not a few are of close concern to public utility undertakers and their responsible officials. In view of the need for assistance with this enormous volume of war legislation, the Solicitors' Law Stationery Society, Ltd., of 31, Breams Buildings, Fetter Lane, E.C. 4, have published a very useful "Key to the Emergency Legislation" (price 5s. net).

This Key, which is copiously cross-indexed, will be of considerable help to solicitors and others in digesting the forty-two Acts and even more numerous Regulations and Orders which have been issued so far, as well as providing a ready means of reference to special provisions which concern individual undertakings. In the case of the more important Regulations, the subject of each Regulation has been included and, for convenience, Regulations issued under certain earlier Acts, such as the Civil Defence Act, 1939, have been included.

GAS FOR MOTOR TRANSPORT

Much has appeared in the lay Press during the past week on this subject, often with an enthusiasm which readers of the "JOURNAL" know must take time to justify in practice, however sound it is in theory. The *Birmingham Mail* were able to obtain what is probably the most authentic information to date through an interview with the Birmingham Gas Department, whose researches into the matter are well known to the Gas Industry. Though the report does not convey much that is not already realized by our technical readers, we quote it (from the *Birmingham Mail* of Sept. 21) as being a clear summary of the present position

"With the arrival of petrol rationing, which becomes operative from mid-night to-morrow, it is not surprising to find transport concerns and other bodies all over the country turning their thoughts to some alternative fuel, particularly gas.

"For nearly 10 years now the Birmingham Gas Department has been conducting intensive research work into the practicability of running internal combustion and oil engines on gas. The Department has been inundated with enquiries from authorities and individuals both at home and abroad. Communication has been made with the responsible Government department on the matter and a reply is awaited.

"What is required, a *Mail* reporter was informed to-day, is the fullest Government encouragement and support, coupled with the assurance that gas will not be rationed and a certain priority for manufacturers of equipment such as gas compressors and cylinders (or bottles as they are familiarly known) to establish the system throughout the country. If this were forthcoming at once it is estimated that under a proper authority within 12 months something like 50,000 vehicles would be on the road driven by gas, with gas stations set up in proper places for refuelling.

"It is not suggested that the Gas Department would be responsible for the setting up of any such system, but rather that it would co-operate in the fullest advisory capacity as pioneers of this form of fuel.

"It will be recalled that petrol shortage during the last war resulted in the appearance of unsightly gas balloons attached to the tops of vehicles. That is not the modern method. In fact, the Birmingham Gas Department has had running about the city's street for the last six years a gas-driven van which to all outward appearance is no different to a petrol fed vehicle of similar make and tonnage.

Steel Cylinders

"The equipment comprises a number of steel cylinders fixed rigidly to the vehicle. These cylinders are connected in parallel and charged from one point, which would be the gas station, at a pressure of 3,000 lb. per sq. in. The gas is supplied from the compressor and flows from the storage system through a reducing valve which brings down the pressure to atmospheric. The volume flow is then controlled by the suction of the engine.

"A suitable gas-mixer is attached in place of or in series with the petrol carburettor, and the necessary air/gas mixture drawn in, in a similar way to petrol. The loss in power of the engine is in the order of 10 to 25%, depending on the design of engine.

"The 'bottles' carried on the vehicle are approximately 125 lb. in weight, and each contains 330 cu.ft. of free gas at a pressure of 3,000 lb. per sq. in. This is equivalent to about 1¼ gallons of petrol. Therefore, a number of cylinders are required to give a reasonable radius of operation.

"In view of the necessity of making the system quickly adaptable to all types of vehicles, the Birmingham Gas Department have been collaborating with a West Bromwich firm in the utilization of a special design of trailer, and several are now being made.

"The cylinders would be placed on the trailer together with a part or the whole of the reducing valve system, and the gas entrained into the engine through a relatively long pipe, but it is not thought that this will reduce the volumetric efficiency of the engine to a great extent. This system has the advantage of offering a greater scope for dealing with all classes of motor vehicles, from the private car to the public service omnibus.

Adapted to Oil Engines

"Apart from petrol driven vehicles, it is also claimed that the equipment can be adapted to oil engines by using just 6% of the oil fuel for purposes of ignition.

"As an indication of the advanced stage reached by the Gas Department, it is worthy of interest that a large Midland car manufacturer has ready for production in large quantities a 14 h.p. model which can be run on gas. It will travel 140 miles on one charge, and its estimated cost is about £70 more than the ordinary model of the same horse-power.

"It looks like an ordinary car, the 'bottles' being arranged in the boot at the rear where the charging would be carried out. The cost of converting commercial vehicles of two to five tons is put down at between £120 to £150.

"Lastly, the Department points out that the supply of 'bottles' is now more plentiful than in peace-time, one prominent firm which specializes in their production, turning out something like 12,000 tons of them each week. There is also the possibility of methane gas, obtained from drainage schemes and authorities, being used. Large quantities of this are at present going to waste."

Views of Compressor Makers

The "JOURNAL" last week sought the views of Messrs. Belliss and Morcom, Ltd., the well known makers of compressors, of Ledsam Street Works, Birmingham. Mr. Pain informed our representative that his firm could—with priority—produce a number of suitable compressors in the matter of a few months, but at the moment the chief need, in his opinion, is for an official indication of the direction in which effort should be concentrated. It would, he thinks, take some 8 or 9 months to get a scheme going from the time it was sanctioned. Only two firms are at present known to be equipped for working the "bottles," and other important war work is occupying their attention.

Messrs. Belliss and Morcom were good enough to give us the following memorandum, which was drawn up as a result of their study of the problems involved:

Memorandum on Gas Traction

Coal or coke oven gas, which it is usually considered advisable to de-benzolize, is compressed to a pressure of 5,000 lb. per sq. in. by specially designed multi-stage compressors, and stored at this pressure in fixed storage cylinders situated at the compressing station. The vehicles are fitted with a number (up to about 7) of smaller storage cylinders which are charged from the fixed storage cylinders to a pressure of 3,000 lb. per sq. in. Flexible coupling pipes enable charging to be carried out rapidly, and an automatic valve in the charging line prevents any possibility of overcharging the vehicle cylinders. From the vehicle storage cylinders the gas passes via a stop valve to a two-stage pressure reducing valve where the pressure is reduced to slightly sub-atmospheric, so that, when the engine is not running, gas flow automatically ceases. The gas passes to an air/gas mixer, and thence to the engine.

Quite apart from the question of self-sufficiency in time of emergency, gas operation has the following definite advantages over operation with petrol. There is no wear through liquid fuel reaching cylinder walls, or passing piston rings to contaminate crank case oil.

Starting is easy—no atomizing difficulties with cold engines. Carbonization is much reduced; healthier streets—no carbon monoxide emission; greater efficiency when frequently starting and stopping.

Position to Date

Belliss and Morcom, Ltd., have put down a dozen installations in different parts of the country. These have mostly been experimental, comprising a four-stage 12½ cu.ft. per minute compressor operating one or two lorries. These have conclusively proved that there are no practical difficulties, and that gas can compete with petrol. Given full-scale installation and specially designed vehicle engines for operating on gas, such as are now becoming available, there is little doubt that gas traction could compete with Diesel traction also.

Results

Birmingham Corporation have had considerable experience, and for a couple of years had a 'bus in daily regular operation. The only reason why this 'bus was discontinued was because the Transport Department found it inconvenient to have just one unit operating on gas when the majority of their vehicles were Diesel

driven. Other vehicles, however, are still being operated from this station.

Wallasey Corporation have compressing plant comprising a 12½ and a 30 cu.ft. per minute compressor operating eight Gas Department lorries and one tipper. They also operated a 'bus for a period of twelve months.

There are so many different factors to be taken into consideration that it is impossible to give any general figures for operating cost. A booklet, "Compressed Gas for Motor Transport," issued by the National Gas Council in 1934, discussed these various factors in some detail.

Seeing that the distribution and management charges are small, gas in reasonable quantities should be available at a charging station at 4d. a therm, and on this basis it has been found at Wallasey that the cost of gas compressed, stored, and delivered to the vehicle has been about 3s. per 1,000 cu.ft. As previously mentioned, with a large scheme and specially designed engines there is no reason why gas traction should not compete with Diesel traction.

Capital Cost

While fully realizing that this matter is open to considerable controversy, Messrs. Belliss & Morcom include in their memorandum an estimate of the approximate capital outlay for a charging station embodying a 30 cu.ft. per minute to 5,000 lb. per sq.in. gas compressor with two 19 cu.ft. capacity storage bottles.

Capacity over 8 hours at 80% load factor, 11,500 cu.ft. of free gas. This is sufficient to fill 32 empty vehicle bottles of a standard capacity of 1.76 cu.ft. They estimate that 270 cu.ft. of 470 B.Th.U. gas is approximately equivalent to one gallon of petrol, so that a light lorry fitted with two bottles would have a storage capacity equivalent to about 2½ gallons of petrol. A larger number of bottles can usually be fitted if a greater range is desired.

For the storage station two 19 cu.ft. bottles are proposed, one operating down to 1,500 lb. per sq.in., and the other utilized for topping purposes operating down to 3,000 lb. per sq.in. The combined capacity of these two bottles would be 7,020 cu.ft. of free gas.

The approximate cost of one—30 cu.ft. per minute to 5,000 lb. pressure motor driven compressor with control gear, electric cables from control gear to motor, pipework and valves, two 19 cu.ft. 5,000 lb. per sq.in. storage receivers and automatic charging valve, is £1,350, including delivery to site within 100 miles, and supervision of erection.

A similar approximate cost of vehicle equipment including for each vehicle two 1.76 cu.ft. 3,000 lb. per sq.in. working pressure bottles (equivalent to 2.6 gallons of petrol), with valves and fittings, pressure reducing valve, pressure gauge, gas mixer, and interconnecting pipework, is £90, exclusive of engine modification and fitting to vehicle.

Another Estimate of Cost

"The use of compressed gas for commercial transport is not only a perfectly feasible proposition but is capable of contributing substantially to the national interests," said Mr. J. Kemp-Welch, of Messrs. Peter Brotherhood, Ltd., to a "JOURNAL" representative who sought the opinion of his firm. The Company has had long experience in the manufacture of compressors and has also made a close study of the application of compressed gas to traction, and in Mr. Kemp-Welch's opinion the system is one which, in the long run, would show an actual economy over the use of petrol. There are, of course, several factors that must be considered before any wholesale conversion from petrol to gas, chief of which are the need for compressing plant at suitable filling stations, the necessity for cylinders and the limitations of radius of action. Two at least of these factors are easily settled in the case of passenger transport services within limited areas, local collection and delivery services, and the public health departments of local authorities.

Assuming that gas is available at 4d. per therm, it is estimated that the cost of 500 B.Th.U. gas compressed to 5,000 lb. per sq. in. would be 2s. 6d. per 1,000 cu.ft., the compression process requiring 11 hours or, say, 10 kWh at 1d. per kWh. As 250 cu.ft. of 500 B.Th.U. gas gives equivalent performance to one gallon of petrol, the cost works out at 7½d. against the standard price of a gallon of petrol.

There would appear to be no great difficulty in adapting existing vehicles for the use of compressed gas. All that would be necessary would be to introduce a two-stage reducing valve in order to bring the pressure down to the correct rate for the carburetter. Contrary to a widespread notion, it is not considered that resort need be had to petrol under any circumstances, either in starting up or in climbing steep gradients.

The difficulty regarding the current shortage of cylinders would probably be overcome as soon as the interests concerned could make out a satisfactory case for securing priority in manufacture.

The "Balloon" System

Fitting 300 Bags Per Day

Within a few days one London firm alone will be able to equip up to 300 vehicles per day with bags for the conveyance of gas and carry out the necessary carburetter adjustments for gas propulsion. Mr. J. H. Cooke, Managing Director of Messrs. Grant and West, Ltd., told a "JOURNAL" representative on Monday that the Company had been working on the problem for a long time before the war, and had found that the G.L.C. carburetter, designed after many years' experience by the Gas Light and Coke Company, worked very well indeed on town gas. Messrs. Grant and West are now selling these carburetters.

"We are concerned mainly with commercial vehicles up to about 30 cwt.," said Mr. Cooke. "For heavier vehicles we have not yet reached a satisfactory solution, and are inclined to think that producer gas systems would be preferable. Under our system it will still be possible to use petrol. From 240 to 250 cu.ft. of gas will be equivalent to one gallon of petrol in a normal vehicle, so that with gas at 9d. per therm the equivalent cost will be a fraction over 10d. as against the current price of a gallon of petrol."

Conversion can be carried out by a man who knows his job and has the necessary tools available, in a space of two hours. The gas will be carried in bags made of balloon fabric and the bags will be supplied in three standard sizes—10 by 6 by 4 ft., 15 by 6 by 4 ft., and 20 by 6 by 4 ft., giving capacities of 240, 360, and 480 cu.ft. respectively. To overcome the trouble which arose from rubbing and chafing during the last war, the bags will be placed in boxes, and the bottom of the bag will be held taut so that when the gas is being exhausted the upper part will telescope downwards.

"The gas companies are willing to do their best in co-operation with the users to supply the gas, and there is a move to encourage the garages to install the necessary connections for filling the bags," said Mr. Cooke, who added that a measuring device would not be essential at the outset, as it could be seen at a glance when the bags were full. "The wear on the engine is only a fraction of that with petrol, because gas and oil will not mix and there is no reduction in the lubricating value of the oil. The engine is absolutely cold and clean, and there is no sooting of the sparking plugs. The only drawback is that one does not get quite the same efficiency, but even that is not likely to fall below about 80%."

Mr. Cooke stated that arrangements had been made for the supply of 300 bags per day, and there was a plentiful supply of carburetters. Under conditions of fair wear and tear the life of the bags is three years, and puncture outfits are available for repairing slight leakages with no more inconvenience than the repair of a leaky tyre.

As regards the continued use of petrol as an alternative in gas-propelled vehicles, Mr. Cooke said the supplies would be so arranged that the gas could be turned off and the petrol turned on by the simple process of closing one tap and opening another, and vice versa. The pipe from the bag is placed at the back of the vehicle and the slight ballooning effect caused by the motion of the vehicle sends the gas down the pipe, though the suction of the engine itself will ensure the correct supply. As the bag filling inlet is opened, the outlet to the engine is closed, and when the filling is completed the process is automatically reversed.

Mr. Cooke asked us to stress the point that as this is a development intended essentially to further the national interests in the present emergency, his Company is anxious to give every possible assistance to anyone interested in achieving the same object. He does not regard the matter in any competitive sense, and rather than that other people should waste time and money on any elementary experiments he is willing to place at their disposal the benefit of any of the investigations so far carried out by the Company.

The Bradford Experiments and Others

Bradford Corporation Gas Department—whose scheme of eight filling stations for gas motoring fuel was mentioned in last week's issue of the "JOURNAL"—raised lively local interest in the scheme when one of their own wagons was equipped with roof-frame and bag for this purpose and was seen in the streets. The storage balloon in this case was on a platform extending back over the open wagon from the roof of the cab, the balloon being fastened by cords to a light wood frame. Covered vehicles, of course, do not need the extra platform structure.

The gas is ordinary low-pressure town gas. The balloons are of three-ply material—two-ply canvas and one of rubber—as used in normal practice of bagging off mains in the Gas Industry. They are obtainable from the Bradford Cover and Twine Com-

pany, 6, Diamond Street, Bradford, and Chesterman and Bottomley, Sheerbridge Works, Bradford. In Bradford the Central Garage, Ltd., whose Managing Director (Mr. J. Russell Rose) used gas fuel during the last war, have taken up the alteration and necessary equipment for the carburetter in collaboration with the Gas Department.

The size of the bags at present in use at Bradford is 12 by 6 by 6 ft. with a capacity equivalent to one and two-thirds gallons petrol. The gas runs through a pipe passing into the driving cab, with a stop-cock conveniently placed for the driver to turn his fuel on or off. From here the gas passes into a regulator and injector, entry to the carburettor being regulated by a hand-controlled shutter. The slight conversion of the carburettor to gas instead of petrol fuel is inexpensive, and the cleanliness of gas as against petrol avoids much of the normal dirt collection in the engine.

Starting up, acceleration, and general performance of the Bradford Gas Department's experimental wagon on Sept. 22 were excellent, and it climbed quite a substantial hill easily on second gear. There have been many enquiries about the service and a number of orders already placed for gas balloons.

At Leeds similar activities have proceeded for turning motor users on to gas. Mr. David G. Gunn, Secretary of the Yorkshire Industrial Gas Development Committee, was associated with Mr. Arnold Wilson (Arnold Wilson, Ltd., of Leeds) and Mr. J. Y. Sorton in fitting out an ordinary 8 h.p. saloon car with a roof gas-bag, &c., and the car was run about the Leeds streets with complete success on normal Leeds gas. The bag in this case was quite small —60 cu.ft. capacity, equivalent to about a quarter of a gallon of petrol and giving a range of about ten miles. Carburetter adjustment was not such as to interfere with switching back to petrol at will. Gas filling equipment has now been installed, or is being installed, at various Leeds Corporation gas-works to meet an expected demand. At the present Leeds gas price the fuel cost works out at little more than a third of the cost of petrol. At Bradford—where no special selling price for motor purposes had been fixed at the time of writing—Mr. G. E. Currier (Engineer and Manager) stated that it would be no dearer than petrol and most likely less.

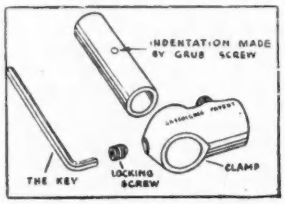
A Proved Service

The Whitwood Chemical Co., of Normanton, have been using high-pressure gas fuel for some years past, and stress the point that it gives 40% thermal efficiency as against 25% with best petrol and 28% to 29% with best Diesel engines. The Whitwood Company have for quite a while been running two six-ton commercial wagons on 3,000 per sq.in. pressure gas in steel cylinders mounted rigidly to the chassis. The wagons have six cylinders, each 6 ft. long by about 8 in. diameter, and each containing gas equivalent to 1½ gallons of petrol. The wagons have a range of about 70 miles per filling on a full load, and about 64 if pulling a loaded trailer. Several other wagons of the Company are being converted now. A gas-air mixer is fixed and the vehicle may change over between gas and petrol if one fuel or the other is used up on a journey. Valves are used to step down the gas pressure. If it is charged into the engine at a moderate pressure there is still higher efficiency and extension of the journey range up to about 100 miles on a filling. The chief difficulty about running long journeys on high-pressure gas is insufficiency of filling stations about the country as yet but Mr. G. G. Wilson, of the Whitwood Company—in a recent interview to the "Yorkshire Evening News," of Leeds—stated that this could be obviated by having storage cylinders filled and refilled at higher pressure at a central station for use in filling the service cylinders, or by having a compressor unit mounted on a small trailer for firms who have a large fleet of vehicles on the road.

Trade News

Ke-Klamps for Gas-Works

Since Ke-Klamps were introduced four years ago by the Geo. H. Gascoigne Co., Ltd., of Chatham Street, Reading, over 400 types and sizes have been developed, allowing for thousands of uses in tubular construction of all kinds. The accompanying diagram illustrates the simple principle of the invention. A central sleeve forms a sliding fit for the main structural tube. Disposed around this central sleeve are one or more sockets into which branch tubes are sliding fits. To hold the main and branch tubes in position hardened steel cup-ended screws are screwed up tight against the outer surfaces of the tubes. The cup ends of the screws bite deeply into the tube surfaces and provide a safe and secure hold. Tests have shown that one screw will hold a lengthwise load of 2½ tons. The tightening key fits into a hexagon socket in the screw head.



With Ke-Klamps any form of tubular construction can be erected by unskilled labour in a fraction of the time required by other methods. Standard unthreaded tubes can be used, and welding, bolting, and screw cutting eliminated. By the Ke-Klamp method the galvanizing protection is left intact, and therefore no corrosion is experienced at the part where the tube enters the clamp. One simple key tool clamps the tubing in position, giving rigid construction, and the result is a neat, sound, engineering job. Should any alteration in position be required a few turns of the key tool will release the screw for the necessary readjustment. Thousands of Ke-Klamps have been used by local authorities for the erection of pedestrian guard rails and barriers, and they are also supplied to the War Office, Air Ministry, Admiralty, Crown Agents for the Colonies, Ministry of Transport and other Government Departments.

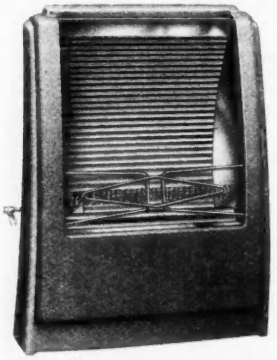
Ke-Klamps are of particular interest to the Gas Industry in connexion with the erection of wharf and jetty rails, gasholder tank handrails and stairways, gasholder crown rails, the platforms, rails and stairways of retort houses, coke handling plants, purifiers, tower scrubbers and other structures, machine guard rails, fittings storage racks, loading platforms, work benches, sheds, gates and towers, owing to the rapidity, easy adjustment and efficiency in building up the essential permanent or temporary structure. It is claimed that the system has revolutionized tubular construction and that in many directions it is replacing more involved and costly systems.

"Whitemount" Pastry Oven

Radiation, Ltd., announce that the "Whitemount" externally heated four-decker oven for pastry, bread, pies, &c., can now be supplied with compartments 2 ft. 6 in. wide inside, in addition to the standard width of 3 ft. 6 in. inside, and that compartments 13 in. high are available. As the result of the introduction of these additional sizes, new sheets have been issued for inclusion in the Radiation catalogue and price book of large apparatus, in substitution for the existing particulars. Already it is becoming evident that there is a quickly growing demand for large cooking equipment to meet the emergency conditions. The Radiation catalogue illustrates and describes the complete range of equipment necessary.

Cannon's New "Sunrise" Heater"

It seems an opportune moment to bring out a portable heater of low consumption, and there should be a ready market for the new "Sunrise" portable gas heater produced by Cannon Iron Foundries, Ltd. The elegant cast-iron frame, which can be finished in a variety of colours, and the polished chromium reflector give the "Sunrise" a very handsome appearance. The heater is so constructed that the frame cannot be discoloured by products of combustion, and there is no risk of burning the reflector. The floor below the heater is also protected from direct radiation. The burner is of cast-iron and therefore incorrodible, and the radiant is of high-quality nichrome wire. Attached to the burner is an independent flint lighter which contains an ingenious free-wheel device to allow all parts of the wheel to be used equally. The lighter is operated by means of a polished chromium lever on the left-hand side of the frame. The lever is simply depressed and released. No special dexterity is necessary and ignition is instantaneous on releasing the handle. (This feature has been patented.) Another good point is that the whole burner unit with the lighter can be removed by withdrawing one screw. A nickel-plated dress guard prevents any possibility of clothes being brought into contact with the radiant.



Unaccounted-for Gas

This Paper was to have been read at the General Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers at Porthcawl, on Sept. 21, which meeting had to be cancelled owing to the outbreak of war. The paper was written prior to the outbreak of hostilities.

by

C. B. FELTON,

Engineer, Manager and Secretary, Ludlow Union Gas Company, Ltd.

This subject has been in the minds of men for about forty years and more than one valuable paper has been written under the same heading.

One writer very rightly says that "the reduction of unaccounted-for gas can only be accomplished by perseverance and attention to detail." Whereas it was probably thought that *all* unaccounted-for gas was due to leakage in mains and services, it is now pretty evident it is due to many causes and I notice that the proportion left to the account of mains and services is not even the lions' share.

Those of you who have read the extract from the Interim Report of the Sub-Committee which was formed to investigate this question, will, I think, derive great hope, and it may be that after you have carried out all the corrections in the prescribed method you will find that your old bogey will be reduced to a figure corresponding to the oxygen content in your gas at works or even below.

I do not propose to go into the various causes which lead to unaccounted-for gas, but I do propose giving you some information which I think will help to decrease the percentage which is allotted to mains and services. As far as I can judge all that falls under this heading in normal districts is a small percentage.

Even while the scientific research is going on to remove the lion's share, let us try to make the effort to complete the removal of that which is savouring of inefficiency on the part of those in charge.

The unfortunate Engineers who have charge of undertakings in colliery districts where subsidence is probably an every-day occurrence have always deserved and I hope received the sympathy of those in charge of undertakings in what we may term normal districts.

We all know that leakage from mains and services is a source of great danger and also a heavy charge on the distribution side, and as one writer rightly says "reflects in terms of criminal negligence upon those in charge."

Examination of Pipes

Keep in mind the following points in connection with your main work.

(1) Purchase from firms of repute.
(2) Be sure that your pipes are properly tested and obtain a covering certificate before taking delivery.
(3) Handle all pipes with due care when unloading, laying out, or stacking, being careful not to remove protection bands at spigot and socket ends until pipse are to be used.
(4) Examine carefully for flaws before laying and have the pipe slung and sounded.

Mechanical Joints

Pipe manufacturers have done a valuable amount of work to assist Engineers by the introduction of mechanical joints.

We have to-day a varied assortment of joints which have been designed for tightness and to allow deflection, the latter being highly desirable in districts suffering from subsidence.

The advent of patent joints has done much to help reduce the leakage and while they do not call for a large amount of increased intelligence on the part of the main laying personnel, they do call for accuracy of manipulation to ensure their success: and I would point out here that all manufacturers of these special joints are only too glad to give expert advice and training to your personnel in this manipulation. You may have, and in fact we all claim to have, good main layers who have been doing the work for years and can soon master any patent joint after they have tried once or twice.

I know the value of this type and would compliment them to the full, but we must not lose sight of the fact that in the majority of cases they have been used to making a joint the result of which was due to their skill and was to all intents visible throughout its whole making. Whereas with the mechanical joint the same man is robbed in a way of the expression of his craft and is in consequence apt to be less conscientious. However, if he is properly trained and shown the accuracy which is necessary he once again realizes that skill can express itself in more ways than one.

Further I would urge all Engineers responsible for the laying of mains to make themselves acquainted with the manipulation of the patent joints so that their supervision can be of real value.

This last expression may sound a little impudent when mentioned before an audience of intelligent people, but I do not fear to tread on this ground because you know full well that most of our difficulties are due mainly to lack of supervision, and I think I am not going too far when I say that main and service laying does not receive the attention it deserves at your hands. In medium and large undertakings perhaps this does not apply as you can afford the services of competent Officials who give this attention, but in the case of small undertakings it is essential if you are looking for the reduction of that remaining percentage, to give both time and thought to this subject.

Increased main and service laying is nowadays the lot of most undertakings either due to renewals of material which has done long service or in consequence of the extensions now most prevalent in all districts. You may not have been responsible for the original mains of your particular undertaking, but you are responsible for renewals and extensions, and it is in this direction that you can start to apply the remedy by seeing that all the future work is of the best possible.

Cost of Testing an Investment

When you have laid your new work or replaced the old, do not be satisfied until you have applied stringent tests.

The cost of this testing is not an outlay—it is an investment and will amply repay you.

Hitherto we have been very faithful to soap as a testing medium, and while I do not minimize the value of the medium I would point out that in certain cases this medium is misleading. I would allow that work which presents a flat surface and is easily visible may be tested by soapsuds, but even so it depends upon the most careful examination.

The mechanical joint immediately terminated the accuracy of this medium, and with its termination its use constitutes a danger. You will need very little imagination to convince yourselves of the impossibility of testing mechanical joints with soap even if you have a very carefully prepared lather. Given good weather conditions the lather would be of service if no other method were available, but if climatic conditions were at all wet it would be a very different proposition. To go to all the trouble of making the special lather which is necessary to give the maximum of assurance, it still leaves a grave doubt as to whether or no the small bubbles which of their own accord swell and burst under atmospheric conditions, and (if the work being tested, is even only moderately inaccessible) you cannot look in all places at once, and while you are looking at one portion a definite change has taken place in another, and in the case of minute leaks you are unable to be sure whether it is the natural action of the soapsuds or no.

If you really think about this you will see the possibilities of error; and I venture to suggest that if you have adopted this method with mechanical joints, you will be wondering how many small leaks you have passed over.

Why not be positive about this question and know that all joints are gas-tight?

We are naturally prone to regard new methods with some suspicion, but if proved they are usually adopted.

Patent Tester

This is illustrated on the pamphlets and comprises a flexible wrapping adopted to surround the joint and so form a pocket to hold water or any liquid suitable for effecting a test.

It is quite simple to use and once filled with water the joint under test can be examined for as long as you wish, and you will find 10-20 seconds is long enough if the joint is sound. If a bubble comes to the surface you keep commencing the examination time from its appearance. If a second bubble appears the time is taken between, or they are observed to ascertain the time if they appear at regular intervals or are only due to dispersed air pockets in which case they automatically cease and the surface of the water remains quite clear of bubbles.

If you have a leaking joint you will notice at once a continuous stream of bubbles rising to the surface of the water and it is obvious that the joint must be remade.

The tester has been designed to suit all kinds of joints and is quite cheap to use.

Low-Pressure Testing

Some Engineers have asked me how you would overcome the case of a leak in a, say, 6 in. pipe and only 4 in. of pressure in the pipe.

They suggest quite rightly that the height of water in the bag may overcome the pressure and instead of gas coming out, water would enter. You can overcome this by a more gradual addition of the water and at intervals of filling examine the surface for bubbles. You will observe these as soon as the water is above the leak and there is no need then to fill the bag.

Compressors

I understand that many Undertakings are not in possession of compressing plant and are unable to adopt this method of testing for this reason.

I was in the same position at Ludlow and made an experiment with a Kismet Trolley Compressor which is used for the inflation of giant motor tyres and was agreeably surprised with its performance.

I was dealing with some 300 yd. of 3 in. main and was able to put this up to 25 lb. per sq. in. in about an hour, and I venture to say that this is high enough for practical purposes.

The Use of Coke Breeze in Producers

Paper at a Meeting of the International Gas Union, Stockholm

By

S. QUARFORT, Stockholm

It appears that "coke breeze" usually means coke of less than 12 mm., from which everything <3 mm. has been screened off. Of such, it has been possible to add up to 40%. As, however, coke breeze at the Stockholm Gas-Works, which will be described later, includes everything below 7 mm. and nothing is screened off from this, the conditions obtaining there are considerably stricter, and even modest amounts of breeze will correspond to greater strain on the producers.

At the Stockholm Gas-Works the following 14 producers are installed, with particulars given in Table I below:

TABLE I.

Nos.	Name.	Internal diameter of furnace.	Grate.	Clinker removal.	Guaranty capacity, tons of coke per day.	Used for coke size.	Year installed.	Remarks
		m.				mm.		
1, 3	Jul. Pintsch, high pressure	2.6	conical	automatic	17–20	6–15	1919	stand by
2, 4	Jul. Pintsch, low pressure	2.6	„	„	18–22	15–25	1919	„
5	Rebuilt by Deutsche Kollergenerat. Co.	2.6	„	„	17	15–25 (+35% 7mm)	1937	working
6–10	Koppers ...	2.6	„	„	30	25–40	1927–1929	„
11–14	Allg. Vergas. Ges. (AVG.)	2.6	„	„	13–16	6–15 with 21–38% 0–10	1930	„

The blast pressure is 300-400 mm., and the steam generated in the water jacket is of low pressure.

The main differences between producer No. 5, rebuilt by "Deutsche Kollergeneratoren-und Oftenbaugesellschaft m.b.H." and producers Nos. 11-14, built by "Allgemeine Vergasungsgesellschaft," are that the water jacket has been made higher, to reduce the risk of clinkers sticking to the chamotte brickwork above the water jacket, and that the slope of the grate has been increased from 18° to 30°.

A considerable amount of breeze is regularly added in all the producers, Nos. 5-14, now in use.

The amounts of breeze added in the guarantee tests of producers Nos. 5 and 11-14, and the resulting gasification efficiencies, are given in Table II, in which the amounts of breeze used in the guarantee tests of Nos. 11, 13 and 14 have been recalculated to 0-7 mm.

Some tests of very large coke, Roburhalden, were made in producer No. 11, A.V.G., in 1937. Unscreened, this coke gave good results. From another consignment of the same coke, containing more than 50% of breeze, coke less than 12 mm. had, on the other hand, had to be screened off. The screened coke could afterwards be used together with the gas-works' own breeze.

TABLE II.—*Guarantee Tests of Producers.*

		No. 5.	Nos. 11 and 14.	No. 13.
Principal coke size	mm.	15–25	6–15	15–25
„ „ water	%	11	9	9
„ „ ash, in dry sample	%	10	16	12
Breeze size	mm.	0–7	0–10	0–10
„ water	%	8	12	11
„ ash, in dry sample	%	14	13	13
Amount of breeze (coke < 7 mm.) added ...	%	33.4	42.8	32.4
Proportion of breeze < 3 mm.	%	52	63	63
Capacity, tons of raw coke per day	to	17.8	13.1	16.8
Net calorific value of gas, 0°, 760	kcal m^3	1100	1028	1069
Gasification efficiency	%	73.2	69.8	70.4
Combustibles left in clinkers	%	7.9	12.4	12.4

(*Continued on page 719.*)

TABLE III.—*Producer Tests with Robur Halden Coke.*

			Unscreened Robur Halden coke.	Other screened Robur Halden coke + 13.7% of own coke breeze.
Principal coke : Screening	> 60 mm.	%	2.6	1.9
	40–60 mm.	%	16.7	13.0
	25–40 mm.	%	32.3	38.1
	15–25 mm.	%	28.8	28.9
	7–15 mm.	%	9.6	10.6
	0–7 mm.	%	10.0	7.5
Own coke breeze „	40–60 mm.	%	—	1.2
	25–40 mm.	%	—	1.0
	15–25 mm.	%	—	0.3
	7–15 mm.	%	—	9.0
	0–7 mm.	%	—	88.5
Actual amount of breeze	< 7 mm.	%	10.0	18.6
Gas yield per ton		m^3	3.55	3.74
New Calorific value of the gas, 0, 760 mm., per m^3		kcal.	1080	1090
Efficiency		%	74.6	74.1
Loss in ash and clinkers		%	0.6	2.3
„ „ sludge		%	1.1	1.3
„ „ calorific value of the gas		%	14.8	11.4
„ „ conduction and radiation ...		%	8.7	9.8
Capacity, tons of coke per day		t.	22.0	16.7
Water content of coke		%	25.0	21.0
Ash content of coke, dry sample		%	11.6	11.8
Composition of gas : CO_2		%	6.0	6.5
O_2		%	0.4	0.6
CO		%	26.4	24.6
CH_4		%	0.5	0.8
H_2		%	13.0	12.2
N_2		%	53.7	55.3
Total			100.0	100.0

In the first test, with unscreened Robur Halden coke, the producer functioned faultlessly. Only 10% of coke breeze, however, was added. In the second test, a tendency to channelling was observed. The amount of coke breeze added (18.6%) to approximately the same principal coke was then larger than in the first test. This indicates that this coke was too large generally for so much coke breeze. The fuel is apt to separate, and channelling will occur.

Operating with Breeze Added

As early as in 1926 breeze was experimentally added on a small scale in the Pintsch producers. The results were bad, however, owing to the difficulty of distributing the breeze evenly. After rebuilding two of the six Pintsch producers then in use and providing them with revolving fuel distributors, breeze was regularly added from the middle of 1927. The addition of coke breeze has been further intensified since the completion of four new Koppers producers in 1929 and four A.V.G. producers in 1930, the latter specially designed for an addition of breeze, and the alteration of producer No. 5 in 1937. All were tested as detailed in Table II above.

The considerable quantities of outside coke bought in the last five years are given in Table IV:

TABLE IV.—*Coke Purchase in* 1934–1938.

Year.	Origin	Tons.	Screening %. > 85 mm. %	60–85 mm. %	40–60 mm. %	25–40 mm. %	15–25 mm. %	7–15 mm. %	0–7 mm. %
1934	Sweden England Poland	20,952	—	—	0.2	4.5	20.2	36.1	49.0
1935	Sweden England Poland	31,023	—	—	1.2	5.8	26.7	29.8	36.5
1936	England Poland	26,924	—	—	0.1	14.0	48.1	18.8	19.0
1937	Sweden Denmark Poland Czechosl.	26,565	0.3	1.8	7.6	17.3	28.0	20.5	24.5
1938	England Poland Czechosl.	25,529	—	0.1	1.6	10.3	26.7	25.3	36.0

It has been possible to sell practically the whole of our own production of 25-40 mm. coke and a large portion of the 15-25 mm. coke, at prices even higher than those of coke for central heating.

The proportion of coke of less than 7 mm. in the purchased coke has occasionally been so suitable that it has been possible to use it directly for the producers with some addition of our own breeze, of which the works in 1938 produced 16,145 tons. On other occasions the proportion below 7 mm. has been so high (30% or more), that the fines under 12 mm. had to be screened off. Suitable quantities of our own coke breeze could then be added to this re-screened coke.

Another advantage has been that the fine material—which often contained coal that had either been loaded with the coke or come from the coke seam of badly carbonized coal—was removed. That coal, which may cause very troublesome formation of tar in the producers, can now with advantage be used on the travelling grates of our steam generating plant, which regularly burns only coke breeze, either this coke of less than 12 mm. or our own coke breeze 0-7 mm.

Addition of Coke Breeze of less than 7 mm.

We will now examine the amounts of coke breeze used in 1938 in the external producers of the Värta Gas-Works. The following composition of coke was used:

TABLE V.—*Principal Coke for External Producers in* 1938.

Description of coke.	Screening %. > 40 mm. %	25–40 mm. %	15–25 mm. %	7–15 mm. %	0–7 mm. %	Average size. mm.
British coke breeze, screened	3.1	13.0	43.4	25.5	15.0	17.2
Polish Robur coke ...	0.6	20.6	50.9	15.9	12.0	19.3
Czech Ostrauer coke ...	0.0	1.8	32.0	46.2	20.0	12.8
Swedish Pearl coke ...	0.0	0.8	17.1	57.1	25.0	10.9
Own coke, 7–15 mm. ...	0.0	0.6	14.3	75.1	10.0	11.6
„ „ 15–25 mm. ...	0.2	2.5	73.5	18.8	5.0	17.8

The value of the principal coke becomes greater in the same degree as it mainly consists of the sizes 7-15 and 15-25 mm., with the latter size predominating.

Varying quantities of 0-7 mm. coke breeze of the following typical screenings were then added to principal coke.

> 15 mm.	0.3%	
10–15 mm.	3.1%	
7–10 mm.	12.1%	
6– 7 mm.	9.2%	
4– 6 mm.	14.0%	
2– 4 mm.	18.9%	
1– 2 mm.	13.5%	84.5%
½– 1 mm.	10.5%	
0– ½ mm.	18.4%	

The proportion of coke breeze of less than 3 mm. is thus about 52%.

Our problem has been to add as much breeze as possible to the different principal cokes, with due attention to the fact that about 2% less breeze must be added when charging Koppers than A.V.G. producers. This charging, large coke and coke breeze in their right proportion, is done approximately every half hour.

The amount of coke breeze that can be added varies with the average size of the coke, with the type of producer, and above all with the proportion of coke of less than 7 mm. The amounts are shown in the following Table:

TABLE VI.—*Amount of Coke Breeze added to different Principal Coke.*

Description of coke.	Principal coke. Average size.	0–7 mm. coke content.	Coke breeze 0–7 mm.	Actual content of 0–7 mm. coke-breeze.
	mm.	%	%	%
Own 15–25 mm. coke ...	17.8	5.0	25	28.8
Polish Robur coke	19.3	12.0	17	27.0
Czech. Ostrauer coke ...	12.8	20.0	15	31.0
British screened coke ...	17.2	15.0	12	24.7
Own 7–15 mm. coke ...	11.6	10.0	10	19.0
Swedish Pearl coke ...	10.9	25.0	7	52.7

During the year the actual amount of breeze <7 mm. has been:

TABLE VII.

Months.	0–7 mm. breeze. %	Number of producers working.	Capacity, tons per day and producer.
January ...	23.1	6–7	13.0
February ...	28.0	7–8	12.0
March	25.2	7–8	12.5
April	22.3	7–8	14.0
May	23.0	8	13.5
June	21.9	4–8	11.5
July	19.6	4	13.0
August ...	18.7	4–7	13.5
September ...	17.7	7	15.5
October ...	22.7	7–8	15.5
November ...	21.9	8	15.5
December ...	17.8	8	16.5
Average ...	21.8		13.8

In practice, we have thus been unable to use as much breeze as according to Table VI ought to have been possible. The reason is that the capacity of the producers, normally about 15 tons of coke per day, had diminished.

The average amount of combustibles in the ash and clinkers was 13.4% in 1938. The ash content of the coke has

averaged 11.9% in dry samples. The loss of coke in ash and clinkers is thus 1.6%, while at the same time the sludge losses were 0.5-1.0%, averaging 0.6%. On a given day, March 23, 1939, the net calorific value of all producer gas made was 1,150 kcal at 0°, 760 mm. The composition of the gas was:

CO_2	.....	6.8%
O_2	.....	0.4%
CO	.....	26.3%
CH_4	.....	0'3%
H_2	.....	12.6%
N_2	.....	53.6%

The gasified coke mixture consisted of:

Polish Robur coke	.....	67%
Own 7–15 mm' coke	.....	14%
Own coke breeze	.....	19%
		100%

The actual content of 0.7 mm. breeze was 25.2%. The loss in clinkers may be estimated at 1.5%, and as much in sludge. The gasification efficiency was 77.5%. Average capacity of producers, 14 tons per day.

Contrary to the statements made in the literature regarding the addition of coke breeze, the above shows that everything below 3 mm. need not be screened off in order to keep very good efficiency. An increase in the amount of breeze primarily results in reduced capacity, and only secondarily in inferior heat economy.

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METAL FINISHES

From a Paper by Paul J. Ziegelbaur, of the Pontiac Varnishing Co., Mich., read before the American Gas Association's Industrial Gas Conference at Cleveland, Ohio

THE past 15 or 16 years have witnessed revolutionary changes in finishing materials and the methods of applying them to nearly every manufactured article from toys to automobiles. Prior to that time practically all finishes were of the ordinary oleo-resinous type, composed of pigments, natural resins, linseed or chinawood oil, driers and thinners using formulas that were originated in the days of hoop-skirts. With the exception of black baking japans, these finishes were either air-dried for periods varying from a day to several weeks, or were given an overnight forced drying in a room heated with steam coils.

The various lacquers and the many types of synthetic finishes, with their well known advantages, have all been developed since about 1923 when the Oakland Motor Car Company first used Duco in finishing its car bodies. The intervening years, from that first break with horse-and-buggy methods up to the present, have stressed so many changes and improvements in materials, application, ovens, baking time, and heating methods, that several volumes could be written in recording them.

The history of the development of ovens and heating methods closely parallels the development of finishing materials, preceding the latter, however, by some seven or eight years due to the necessity of finding better and faster ways of baking black japan on automobile fenders and other parts.

The First Conveyor Oven

As far as we know, the first conveyor oven ever built was constructed by Henry Ford in a building on the corner of Woodward Avenue and the Boulevard, in Detroit. It was in 1915 or 1916, and the oven was heated by gas burned in pipe burners. Shortly afterwards, a monorail type conveyor oven was built in the plant of the old Michigan Stamping Company, now the Briggs Manufacturing Company. It is understood that this oven was not very satisfactory.

The first conveyor oven used in regular production, baking black japan on fenders, was built at the Hudson Motor Car Company in 1917. It was the first oven ever built to incorporate the principle of the air seal at the entry and exit openings. This oven was also heated with pipe burners, with the products of combustion passing through radiator tubes mounted on the walls of the oven.

The well known "A" type oven was developed about 1919-1920. E. F. Collins of the General Electric Company is given credit for its development. The oven was designed around an ideal time-temperature curve for the baking of japan, and its characteristic shape was the logical result of studying such a curve. These ovens were known as compensating ovens, due to the discovery that air could be made to flow through them in a direction counter to the movement of the work, picking up heat from work leaving the oven and delivering heat to work entering the oven.

The electrically heated "A" type oven, although expensive to operate and expensive to install, enjoyed several years of popularity. About this time the oil-fired, indirect type of external air heater was developed by Laurence, Harrison, and others. These external air heaters produced results equal to or better than electric heat, and were much less expensive to install and operate. So, commencing about 1920 or 1921 large numbers of the oil-fired heaters were installed in existing and new ovens.

The year 1928 found most of the large and important oven installations heated with either oil or electricity. The development at that time of the gas-fired recirculating type of air heater has enabled gas to become the preferred fuel for heating all types of ovens in spite of decreased fuel oil prices.

The writer well remembers the arguments encountered when he first tried to introduce the idea of heating an oven with hot air mixed with the products of gas combustion together with recirculation back through the heater. He was told that it would blow up, that incineration of oven fumes would produce soot, that the products of combustion were injurious to paint, that the paint would not dry unless the products of combustion were kept out of the oven, &c. To-day, many hundreds of these heaters are in use all over the country, and not one of the arguments against their use has ever proved valid.

For Most Delicate Lacquers

Gas, burned in these heaters, is being used to dry the most delicate lacquers and to bake the roughest japan. It bakes the oil type finishes and the infinite variety of synthetics with equal facility. It can produce a wrinkle finish, or be adjusted so that there will be no wrinkling when it is not desired. The products of combustion of gas have no effect on any colour, and gas burned in recirculating heaters is being used to dry lacquers and synthetic finishes in colours ranging from the purest white through the pastel shades to all solid colours.

One argument that has been advanced by paint men against the use of the recirculating heater is that the products of

combustion mixed with air cuts down so much on the oxygen content of the mixture that the paint will not dry as fast as in an oven where there are no products of combustion. The following calculations will prove that these arguments cannot be substantiated in fact. Assume a moderately sized oven requires a delivery of 10,000 cu.ft. of air per minute at a temperature of 500° F. The combustion of 46.7 cu.ft. of 1,000 B.Th.U. natural gas per minute is required to produce the necessary heat. The products of combustion will amount to 490 cu.ft. per minute, composed of 354 cu.ft. of nitrogen, 89 cu.ft. of water vapour, and 47 cu.ft. of CO_2. The mixture entering the oven will have the following composition:

	Cu.ft.	%
O_2	1,997	19.97
N_2	7,867	78.67
CO_2	47	0.47
H_2O	89	0.89
	10,000	100.00

Whereas air contains 20.9% of oxygen, the above mixture contains 19.97%, a reduction of less than 1%. Since the quantity of air required to carry the necessary heat into the oven is several times the amount needed for the actual drying of the paint, it follows that the presence of combustion gases will have no effect whatsoever on the drying time. As far as the water vapour is concerned, it can be shown that the water vapour added by the products of combustion amounts to less than a 2% addition to a 50% relative humidity at 70° F.

The use of recirculation with the gas-fired air heater is very important from the standpoint of efficiency and operating cost, and should be employed to the fullest extent. Many operators have been timid about utilizing the possibilities of recirculation, and are simply wasting heat when they do not use it. It is possible to recirculate as high as 85% of all the air delivered to the oven when baking certain types of black japan. With lacquers and synthetics the recirculation must be reduced to about 50% and sometimes a little lower. This is especially true if the paint contains improperly cooked chinawood oil.

A Complicated Problem

The baking of finishes on manufactured articles seems quite a simple process to the uninformed person. One simply coats an article with paint, pops it into an oven, and after a suitable length of time takes it out finished. Many of us have often wished that it were as simple as that. Actually, the baking of japans, lacquers, and enamels is nearly as complicated as a mathematical problem.

There are four factors involved in the baking operation. The first is the object to be finished. Variations in shape, size, thickness of various sections, condition of the surface, &c., have an important bearing on the finishing of the piece. The location of holes or sharp edges or corners presents a problem that is sometimes difficult to solve. For example, the hole cut in the rear fender of the newer cars for the petrol tank filler pipe required a change in japan dipping viscosity, a new hanging position on the oven conveyor, and a change in the baking cycle in order to get satisfactory results.

The second factor is the finishing material. It must be of the right type, made of the best materials and held within close limits to a specified standard to produce the desired results. If the paint is not right a good finish cannot be had.

The third factor that affects the forced drying or baking process is the oven. Ovens are more than heated enclosed spaces. They are machines, as precisely designed and closely adjusted as a machine tool. Unless designed by experts, and built and adjusted by experienced oven engineers they can be a source of continual annoyance.

The last factor in the baking equation is the fuel. With the three other factors always present as potential headaches, the best way of eliminating a fourth possible source of trouble is to use gas as the source of heat and burn it in external, recirculating air heaters. It is the most nearly trouble-free combination yet found for the heating of ovens. Maintenance costs are very low—lower, in fact, than with any other heating method. For example, one Detroit plant reports an annual saving of over $8,000.00 on upkeep costs alone since replacing oil-fired heaters with gas-fired recirculating heaters.

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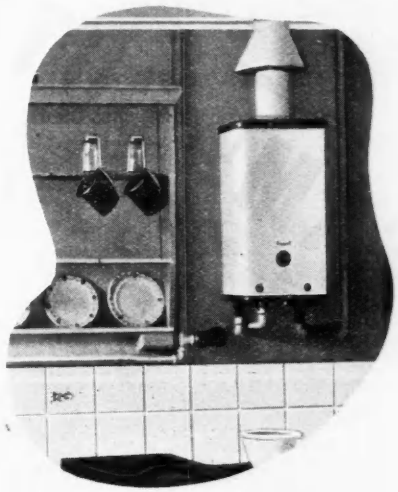

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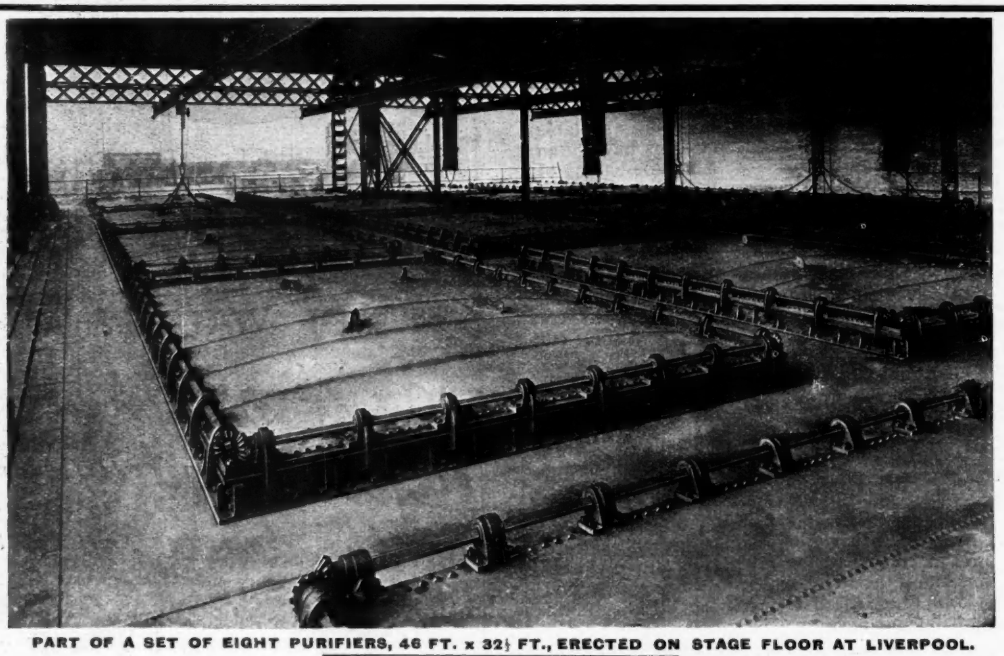

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Markets and Manufactures

Current Sales of Gas Products

The London Market

Sept. 25.

There is very little business passing in tar products for export owing to the necessity for obtaining export licences.

Pitch has risen to 27s. 6d.-30s. per ton f.o.b.

Creosote is said to be nearer 5d. per gallon.

Refined tar remains steady at 3¼d. to 4d. per gallon, with very little business.

Pure tuluole is nominal at 2s. 6d. to 2s. 7d. per gallon.

Pure benzole is about 1s. 9d. per gallon, all ex makers' works.

The Provinces

Sept. 25.

Crude Gas-Works Tar, 10s. to 15s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 25s. to 27s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 25s. to 27s.* Toluole, naked, North, 1s. 10d. to 1s. 11d. Coal tar, crude naphtha, in bulk, North 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4¼d. to 1s. 5d. Heavy naphtha, North, 1s. 2¼d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3¾d. to 4¼d.; low gravity, 4d. to 4¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4¼d. to 4¼d. per minimum 40% purely nominal, "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1,080, 5¼d. to 5¾d.; heavy tar oil, gr. less than 1,080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

Scotland

GLASGOW, Sept. 23.

There is still considerable reluctance on the part of producers to quote prices and consequently business is not at all easy.

Crude gas-works tar.—The actual value can to-day be called 28s. to 30s. per ton, *ex* works in bulk, but this is nominal.

Pitch of vertical quality has been increased, quotations to-day being in the region of 24s. to 25s. per ton, f.o.b. for export, and round 20s. to 22s. 6d. per ton, *ex* works in bulk for home trade.

Refined tar is unchanged in the home market at 3¾d. to 4d. per gallon, and for export quotations are 2¾d. to 3d. per gallon, into buyers' packages at makers' works.

Creosote oil.—Most consumers are well covered on contract and to-day's values can be taken as being approximately as follows: Specification oil, 4d. to 4¼d. per gallon; low gravity, 4¼d. to 4¾d. per gallon; neutral oil, 4d. to 4¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—Under war conditions the position is completely reversed. Producers are withholding offers and buyers are now interested at the following prices: Pale, 97/99%, 1s. 6d. to 1s. 9d. per gallon; Dark, 97/99%, 1s. 3d. to 1s. 6d. per gallon; Pale, 99/100%, 1s. 9d. to 2s. per gallon; all *ex* works in buyers' packages.

Crude naphtha does not show any alteration at 5d. to 5½d. per gallon, *ex* works in bulk, according to quality.

Solvent naphtha.—Prices are nominal with 90/160 grade at 1s. 4d. to 1s. 5d. per gallon and 90/190 heavy naphtha at 1s. 1½d. to 1s. 2d. per gallon.

Motor Benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—Supplies are not readily procurable with prices nominal at 12s. to 13s. per gallon for 90/160 grade and 14s. to 15s. per gallon for 90/140 grade.

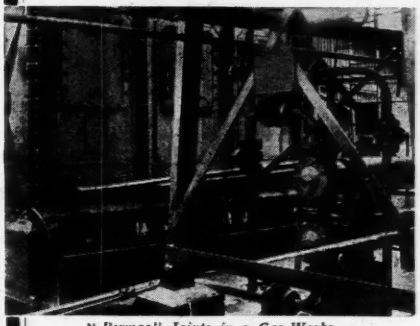
A Useful Booklet for Employees

A very useful little booklet has been published by British Timken, Ltd., of Aston, Birmingham, for the benefit of their employees in times of emergency. In view of its general interest and importance, the booklet has been circulated to a large number of engineering concerns and has met with widespread appreciation. Clearly marked on the cover "Keep This With You Always," the booklet is intended to be carried by every employee during war time, tells its owner exactly what to do in an air raid, describes the first-aid treatment of poison gas casualties, and also serves as an identity card. Valuable information is also included on the cleaning and disinfecting of respirators of all kinds.

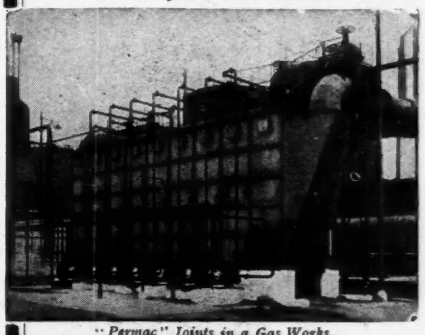
There's only one

Permac!

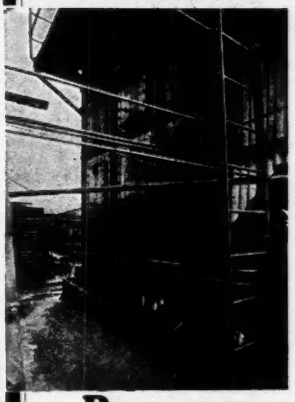
METAL-TO-METAL JOINTING MATERIAL.



"Permac" Joints in a Gas Works



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Be sure you get it!

Here is a selection of "Permac" joints photographed in various Gas Works. "Permac," the Metal-to-Metal Jointing, has been holding up difficult joints like these for over 25 years. Send for particulars.

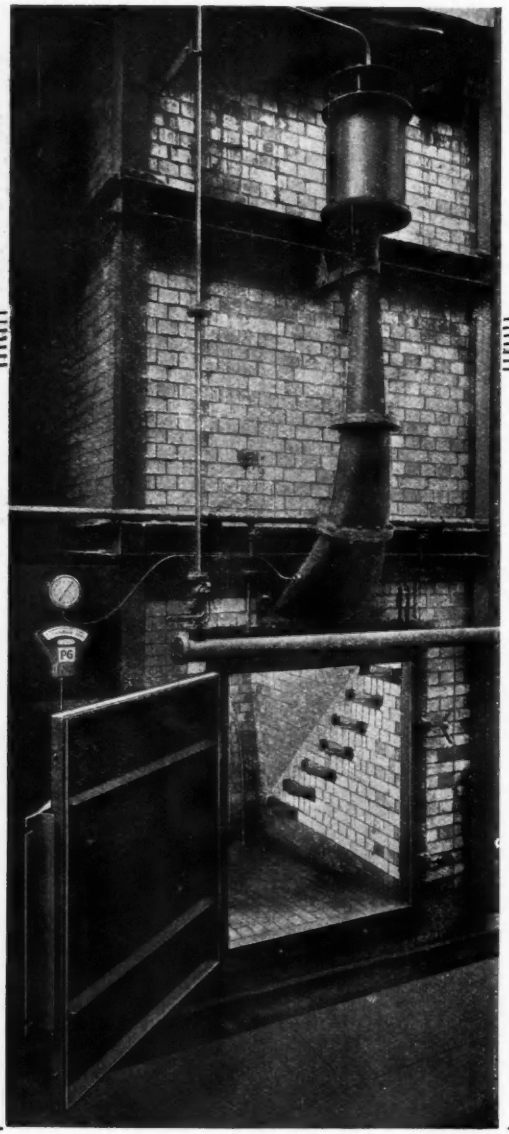
Sole Manufacturers:

THOMAS & BISHOP LTD

37, Tabernacle St., LONDON, E.C.2

Telephone: Clerkenwell 3351 (2 lines)

MODERN DESIGN—



MODERN

EQUIPMENT

Pressure producer equipment installed with Glover-West vertical retorts for the Leeds Corporation Gas Department (Meadow Lane Works)

West's carbonizing plants combine the features of present-day practice by which the most exacting requirements of retort house control and efficiency are met. The increased fuel economy realised by the introduction of pressure producer equipment is one direction in which the ideal of maximum results from the coal carbonized is attained.

WEST'S

WEST'S GAS IMPROVEMENT CO., LTD. MILES PLATTING, MANCHESTER 10
AND BATH ROAD, HARMONDSWORTH, WEST DRAYTON, MIDDLESEX.

GAS STOCKS AND SHARES

Business was again very limited on the Stock Exchange last week though towards the close the tone became a trifle brighter. Doubtless the proximity of the revised Budget which Sir John Simon introduces to-day has been holding up enquiries, but so far as the gilt-edged market is concerned minimum prices continue to retard the flow of business. Several bright spots occurred in the industrial section where a number of the leaders made substantial recoveries from their earlier low levels. Home-rail stocks were rather more active and oil shares also received more attention. Rubber and mining shares were neglected.

The volume of business in the Gas market continued to be negligible, transactions being almost confined to Gas Light units, Imperial Continental, and South-Eastern Gas Corporation £1 shares. It will be seen in the Lists that a number of quotations, especially those of fixed-interest stocks, were drastically marked down. Actually there has been no all-round reaction in this market, but lower levels have been quoted as and when enquiries are made and prices reduced accordingly, although no business may have resulted. Among the heaviest losses in the Official List are those of Alliance & Dublin with a fall of 30 points to par, South Metropolitan 6% preference which dropped 22½ to 95, and Croydon maximum dividend stock with a loss of 12 points to 82½ while a number of stocks depreciated 8 points or more. At the Provincial Exchanges the majority of issues quoted at Bristol were marked down and at the local Exchange, Newcastle units closed 1s. 6d. lower at 19s. The only changes of note in the Supplementary List were the heavy falls in the Cambridge stocks, the nominal quotations of the 10% maximum stock being marked down 50 points to 115.

The Directors of the United Kingdom Gas Corporation have declared an interim dividend on the ordinary shares of 2%.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 22.	Rise or Fall on Week.
1,767,439	Sept. 4	8	8	Alliance & Dublin Ord. ...	95—105	–30
374,000	June 19	4	4	Do. 4 p.c. Deb. ...	88—93	...
877,576	May 8	5	5	Asscd. Gas & Water U'd'cts Ord.	15/—17/–	–1/–
500,000	"	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
535,545	"	4	4	Do. 4 p.c. Red. Cum. Pref.	16/—18/–	...
318,730	"	4	4	Do. 4 p.c. Irred. Cum. Pref.	15/—17/–	...
750,000	Sept. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95*	–2
560,070	Aug. 21	7	7	Barnet Ord. 7 p.c.	148—158	..
300,000	Apl. 6	1/4½	1/9½	Bombay, Ltd.	19/—21/–	...
181,185	Aug. 21	9½	9½	Bournemouth Sliding Scale ...	182—192	...
690,526	"	7	7	Do. 7 p.c. max. ...	146—151	...
493,960	"	6	6	Do. 6 p.c. Pref. ...	122—127	...
50,000	June 5	3	3	Do. 3 p.c. Deb. ...	70—75	...
362,025	"	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	"	5	5	Do. 5 p.c. Deb. ...	110—115	...
357,900	Aug. 21	7½	7½	Brighton, &c., 6 p.c. Con. ...	130—135	...
659,955	"	6½	6½	Do. 5 p.c. Con. ...	115—120	...
205,500	"	6	6	Do. 6 p.c. 'B' Pref. ...	108—113	...
855,000	Sept. 18	8	7	British Ord.	95—105*	–5
100,000	June 19	7	7	Do. 7 p.c. Pref.	136—141	...
350,000	"	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	June 5	4	4	Do. 4 p.c. Red. Deb. ...	92—97	..
450,000	"	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...
100,000	22 May '33	6	4	Cape Town, Ltd.	½—¾	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref.	½—¾	...
150,000	June 19	4½	4½	Do. 4½ p.c. Deb.	58—68	...
626,860	July 17	6	6	Cardiff Con. Ord.	95—105	–10½
237,860	June 5	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
98,936	Mar. 20	2/–	2/–	Colombo Ord.	1 7/16—1 7/16	...
24,510	"	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	21/—23/–	...
739,453	Mar. 20	–/11.48	–/11.48	Colonial Gas Assn. Ltd. Ord. ...	16/—18/–	...
296,144	"	1/3.30	1/3.30	Do. 8 p.c. Pref.	21/—23/–	...
1,775,005	July 31	4	4	Commercial Ord.	47—52	...
140,000	Aug. 21	4	4	Do. 4 p.c. Red. Pref. ...	90—95	...
620,000	June 5	3	3	Do. 3 p.c. Deb.	56—61	...
286,344	Aug. 21	5	5	Do. 5 p.c. Deb.	97—102	–6
200,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	94— 99	...
807,560	July 31	7	7	Croydon sliding scale	121—126	...
644,590	"	5	5	Do. max. div.	80—85	–12
620,385	June 19	5	5	Do. 5 p.c. Deb.	107—112	...
208,660	Aug. 21	5	5	Dudley, Brierley Hill & Dist. Ord.	100—105	...
82,275	"	5	5	Do. 5 p.c. Con. Pref. ...	100—105	...
79,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
239,000	July 31	5	5	East Hull Ord. 5 p.c.	86—91	...
187,215	Aug. 21	6	5½	East Surrey Ord. 5 p.c. ...	98—103	...
176,211	June 5	5	5	Do. 5 p.c. Deb. ...	105—110	...
250,000	July 3	4	8	Gas Consolidation Ord. 'B' ...	18/6—20/6	...
250,000	May 22	4	4	Do. 4 p.c. Red. Cum. Pref.	17/—19/–	...
9,172,463	July 31	5⅜	5⅜	Gas Light & Coke Ord. ...	14/—17/–a	–1/–
2,600,000	"	3½	3½	Do. 3½ p.c. max.	52—57	–13
4,477,106	"	4	4	Do. 4 p.c. Con. Pref. ...	75—85	–9½
2,993,000	July 3	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	80—85	...
8,602,497	May 22	3	3	Do. 3 p.c. Con. Deb. ...	57—62	–3
3,642,770	"	5	5	Do. 5 p.c. Red. Deb. ...	97—102	...
1,500,000	"	4½	4½	Do. 4½ p.c. Red. Deb. ...	90—100	–5½
700,000	Sept. 4	3½	3½	Do. 3½ p.c. Red. Ded. ...	85—95	–½
270,466	July 31	6	6	Harrogate New Cons.	95—100	...
157,500	Mar. 20	‡1/–	‡1/–	Hong Kong and China Ord. ...	⅝—¾	...
5,600,000	May 8	8	12	Imperial Continental Cap. ...	82—92	–8
172,810	July 31	3½	3½	Do. 3½ p.c. Red. Deb. ...	85—90	...
63,480	June 19	3	3	Maidstone 3 p.c. Deb.	57—62	...
45,000	May 22	†10	†10	Malta & Mediterranean ...	128—133	...
				Metropolitan (of Melbourne) ...		
392,000	Apl. 6	5½	5½	5½ p.c. Red. Deb.	98—103	...
231,977	Aug. 21	5	5	M.S. Utility 'C' Cons.	93—98	...
968,658	"	4	4	Do. 4 p.c. Cons. Pref. ...	82—87	...
390,076	June 19	4	4	Do. 4 p.c. Deb. ...	90—95	...
148,955	June 19	5	5	M.S. Utility 5 p.c. Deb. ...	105—110	...
125,000	July 3	3½	3½	Do. 3½ p.c. Red. Bds. ...	92—95	...
675,000	May 8	†6	†3	Montevideo, Ltd.	52—62	...
250,000	Aug. 21	7½	7½	North Middlesex 6 p.c. Con. ...	133—138	...
396,160	July 31	5	5	Northampton 5 p.c. max. ...	101—106	...
300,000	April 24	†9	†7	Oriental, Ltd.	135—145	...
468,537	June 5	7	8	Plymouth & Stonehouse 5 p.c.	112—117	...
621,667	July 31	8½	8½	Portsmouth & Gosport Cons.	132—142	...
241,446	"	5	5	Do. 5 p.c. max.	95—100	...
73,350	"	5	5	Do. 5 p.c. Pref.	100—105	...
75,000	"	4	4	Do. 4 p.c. Pref.	81—86	...
114,000	July 31	5	5	Preston 5 p.c. Pref.	100—105	...
247,966	June 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	95—100	...
625,959	July 17	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
15,000	Sept. 4	6	6	San Paulo 6 p.c. Cum. Pref. ...	7½—8½	–
441,275	May 8	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	19/—21/–	...
460,810	Mar. 20	–/10⅜	–/10⅜	" " 4½ p.c. Cum. Pref. ...	18/6—20/6	...
133,201	Aug. 21	5	8½	Shrewsbury 5 p.c. Ord. ...	107—117	...
9,000	June 5	‡4	‡4	South African Ord.	4—5	...
1,996,297	Aug. 21	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	16/—18/–	–2/–
1,000,000	"	–/10⅜	–/10⅜	Do. 4½ p.c. Red. Cum. Pref.	18/—20/–	...
769,191	"	4	4	Do. 4 p.c. Cum. Pref. ...	15/—17/–	...
450,000	"	4	4	Do. 4 p.c. Deb.	95—100	...
150,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
6,709,895	July 31	6	5	South Met. Ord.	70—80	...
1,135,812	"	6	6	Do. 6 p.c. Irred. Pref. ...	90—100	–22½
850,000	"	4	4	Do. 4 p.c. Irred. Pref. ...	75 —80	–5
1,895,445	June 19	3	3	Do. 3 p.c. Deb.	57—62	–11
1,000,000	July 17	5	5	Do. 5 p.c. Red. Deb. ...	95—105	–6½
600,000	"	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	92—97	...
1,543,795	July 31	6	6	South Suburban Ord. 5 p.c. ...	90—100	...
512,925	"	5	5	Do. 5 p.c. Pref.	90—100	–8½
500,000	"	4	4	Do. 4 p.c. Pref.	75—85	–5½
250,000	"	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	89—94	...
888,587	June 5	5	5	Do. 5 p.c. Deb.	95—105	–7½
250,000	"	4	4	Do. 4 p.c. Deb.	89—94	...
200,000	July 31	3	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...
427,859	Sept. 18	1/2⅜	9⅜	S. Western Gas & Water Ord.	14/—16/–*	–1/–
160,523	Apl. 6	–/10⅝	–/10⅝	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
110,000	June 5	4	4	Do. 4 p.c. Red. Deb. ...	92—97	...
750,541	July 31	5½	5	Southampton Ord. 5 p.c. ...	100—105	...
148,836	June 5	4	4	Do. 4 p.c. Deb.	89—94	...
350,000	July 31	5½	5½	Swansea 5½ p.c. Red. Pref. ...	90—100	–9½
200,000	June 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—100	–3½
1,076,490	July 31	6½	6½	Tottenham and District Ord....	90—100	..
409,835	"	5½	5½	Do. 5½ p.c. Pref.	108—113	...
62,235	"	5	5	Do. 5 p.c. Pref.	100—105	...
453,380	June 19	4	4	Do. 4 p.c. Deb.	87—92	...
85,701	June 5	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
1,247,505	May 8	4	6	U. Kingdom Gas Cor. Ord. ...	15/—17/–	...
1,085,952	May 8	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	17/—19/–	...
772,709	"	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	17/6—19/6	...
745,263	June 5	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	13/6—15/6	...
1,093,656	Sept 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95*	–2
378,106	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	117—122	...
133,010	"	5	5	Do. 5 p.c. Pref. ...	90—100	...
1,371,138	July 31	7	6½	Wandsworth Consolidated ...	107—112	...
2,525,768	"	4	4	Do. 4 p.c. Pref.	77—82	...
1,343,964	June 19	5	5	Do. 5 p.c. Deb.	90—100	–10½
383,745	"	4	4	Do. 4 p.c. Deb.	89—94	...
400,000	"	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	92—97	...
558,342	July 31	6¾	6¾	Watford and St. Albans Ord. ...	95—105	...
200,000	"	5	5	Do. 5 p.c. Pref.	100—105	...
200,000	"	5½	5½	Do. 5½ p.c. Pref.	106—111	...
200,000	"	4	4	Do. 4 p.c. Rd. Pf. (1973/8)	90—95	...
100,000	—	—	—	Do. 4 p.c. Red. Pf. (1959)	97—102	...
200,000	June 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
200,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	83—88	...

a.—The quotation is per £1 of Stock. * Ex. Div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Contd.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Sept. 22.	Rise or Fall on Week.
202,152	Sept. 4	5	5	Ascot Ord.	95—100	...
128,182	July 3	5	5	Do. 5 p.c. Pref.	101—106	...
31,035	Aug. 21	–/4⅛	–/4⅛	Associated Utilities 4 p.c. Pref.	15/—17/–	...
100,000	June 19	3⅛	3⅛	Do. 3⅛ p.c. Red. Deb. ...	93—98	...
17,000	Aug. 21	8	8	Bognor Orig. Ord. 'A' ...	137—147	...
62,210	,,	8	8	Do. New Add. 'A' ...	137—147	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	132—142	...
37,440	July 31	10	10	Cam. Univ. & Town 10 p.c. max.	110—120	–50
125,970	,,	7	7	Do. 7 p.c. max.	90—100	–25
39,025	,,	5	5	Do. 5 p.c. max.	80—90	–12½
96,410	July 17	4½	4½	Cardiff 4½ p.c. Pref.	92—97	...
55,520	July 31	6	6	Colchester 6 p.c. Pref.	113—118	...
90,550	Sept. 18	5	5	Do. 5 p.c. Deb. ...	100—105*	–3
150,000	July 31	4	4	Croydon 4 p.c. Pref.	84—89	...
130,000	June 19	4	4	Do. 4 p.c. Deb.	90—95	...
65,000	Aug. 21	7½	7½	Eastbourne 'A' 5 p.c.	120—130	...
198,000	,,	6	6	Do. 'B' 3½ p.c.	103—113	...
112,312	,,	5	5	Do. 5 p.c. Pref.	100—105	...
130,000	June 19	5	5	Do. 5 p.c. Deb.	105—110	...
130,500	Aug. 10	7½	7½	Exeter New Ord. (£10) ...	13½—15½	...
24,000	Aug. 21	8½	8½	Gt. Yarmouth 8½ p.c. max. (£30)	24—29	...
59,400	,,	7½	7½	Do. 7½ p.c. max. (£30) ...	26—31	...
51,160	June 5	5½	5½	Do. 5½ p.c. Deb.	115—120	...
152,600	Sept. 4	9	8	Guildford Cons.	145—155	...
54,055	,,	5	5	Do. 5 p.c. Pref.	100—105	...
68,250	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
156,600	Aug. 21	7	7	Hampton Court Cons. ...	100—110	...
86,046	June 19	‡4½	‡5	Holyh'd&N.W.G.&W.Cpn.Ord.	13/6—15/6	...
80,000	Aug. 21	4	4	Lea Bridge 4 p.c. Pref.	78—83	...
60,000	,,	6	6	Do. 6 p.c. Pref.	113—118	...
94,876	June 5	4	4	Do. 4 p.c. Deb.	87—92	...
73,620	Sept. 18	8⅛	8⅛	Luton Cons. 'A'	150—160*	...
107,960	Sept. 18	5½	4	Mid Kent Ord. (£10)	8—9*	–½
230,940	July 31	10	10	Oxford & District Ord. ...	145—155	...
47,112	,,	5	5	Do. 5 p.c. Pref.	95—105	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111	...
126,193	May 8	7½	7½	Peterborough Ord.	134—139	...
64,990	Sept. 18	7⅛	7	Redditch Ord.	110—120*	–5
166,850	July 31	8	8	Romford Ord.	137—142	...
60,000	,,	4	4	Do. 4 p.c. Pref.	95—100	...
44,000	Sept. 18	5	5	Do. 5 p.c. Deb.	105—110*	–2
25,570	July 31	5½	5½	Rugby 5½ p.c. Pref.	116—121	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	June 5	5½	5½	Do. 5½ p.c. Deb.	113—118	...
110,950	Aug. 21	8	8	Ryde Ord.	137—147	...
270,086	Sept. 4	7	7	Slough Ord.	120—130	...
21,000	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
28,872	May 18	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	16/—18/–	...
28,866	Sept. 18	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	16/6—18/6*	–/6
117,228	Aug. 21	7	5	Swindon Cons.	98—103	...
60,425	June 5	5	5	Do. 5 p.c. Deb.	103—108	...
64,380	June 19	5	5	Torquay & Paignton 5 p.c. Pref.	102—107	...
130,000	Aug. 21	8	5	Wakefield Ord.	101—106	...
81,650	,,	5	5	Do. 5 p.c. max.	81—86	...
82,000	July 31	6	6	Weymouth Ord.	101—106	...
273,626	Aug. 21	7	7	Wolverhampton Cons. Ord. ...	126—131	...
98,384	,,	6	6	Do. 6 p.c. Pref.	113—118	...
160,000	June 19	5½	5½	Do. 5½ p.c. Red. Deb. ...	102—107	...
106,490	Aug. 21	5½	5½	Wrexham Ord.	89—94	...
90,000	June 19	5	5	York 5 p.c. Red. Deb.	102—107	...
133,640	July 31	6½	6	Yorktown (Cam.) 5 p.c. Cons.	112—117	...
120,000	,,	5	5	Do. 5 p.c. Pref.	100—105	...
35,000	June 19	5½	5½	Do. 5½ p.c. Deb.	110—115	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 22.	Rise or Fall on Week
347,756	July 31	6	5	Bath Cons.	107—112	–4½
1,667,250	,,	5	5	Bristol, 5 p.c. max.	98—103	–5½
120,420	June 5	4	4	Do. 1st 4 p.c. Deb.	93—98	–2½
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	93—98	–2½
328,790	,,	5	5	Do. 5 p.c. Deb.	108—113	–4
274,000	July 31	5	5	Newport (Mon.) 5 p.c. max. ...	90—95	–1½
13,200	Sept. 4	8⅝	7	Pontyp'l Gas & W. 10 p.c. 'A'	12½—13½	...
13,600	,,	6	5	Do. 7 p.c. 'B'	10½—11½	...
40,000	,,	6	5	Do. 7 p.c. 'C'	10½—11½	...
140,778	July 31	5	5	Weston-super-Mare Cons. ...	95—100	–5½
64,338	June 19	4	4	Do. 4 p.c. Deb.	90—95	–5½
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	140—150	–3

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 22.	Rise or Fall on Week
157,150	July 31	6½	5	Chester 5 p.c. Ord.	105—108	...
92,500	June 5	4	4	Do. 4 p.c. Pref.	85—90	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	86—89	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	96—100	...
2,167,410	Aug. 21	6	6	Liverpool 5 p.c. Ord.	110—112	–1
245,500	June 19	5	5	Do. 5 p.c. Red Pref. ...	100—105	...
306,083	July 17	4	4	Do. 4 p.c. Deb.	99—101	...
106,280	July 31	10	10	Preston 'A' 10 p.c.	174—184	...
188,219	,,	7	7	Do. 'B' 7 p.c.	126—136	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 22.	Rise or Fall on Week
122,577	Aug. 21	8	8	Blyth 5 p.c. Ord.	146½—148½	...
732,000	Aug. 21	3	4	Hartlepool G. & W. Cn. & New	74½—76½	...
2,061,315	July 31	5⅜	5	Newcastle & Gateshead Con.	18/—20/–σ	–1/6
682,856	,,	4	4	Do. 4 p.c. Pref.	83—88	...
776,706	June 5	3½	3½	Do. 3½ p.c. Deb.	83—84	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	100—105	...
332,351	Aug. 21	6	6	Sunderland 6 p.c. max. ...	126—128	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 22.	Rise or Fall on Week
542,270	Aug. 10	9	6	Derby Con.	130—135	...
55,000	June 19	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	June 19	5	5	Long Eaton 5 p.c. Pref. ...	9—11	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	100—105	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 22.	Rise or Fall on Week
10,000	Aug. 21	10	10	Great Grimsby 'A' Ord. ...	180—190	...
6,500	,,	10	10	Do. 'B' Ord. ...	180—190	...
79,000	,,	10	10	Do. 'C' Ord. ...	175—185	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	131—134	...
95,000	July 3	4	4	Do. 4 p.c. Deb.	99—101	...

σ The quotation is per £1 of Stock.
* Ex. div. ‡ For year.

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